Sirfojie Rajah 1817

A

COMPENDIUM

2152

556

OF THE

ANATOMY, PHYSIOLOGY, AND PATHOLOGY,

OF

THE HORSE:

BEING

A CLEAR AND FAMILIAR DESCRIPTION OF THE VARIOUS ORGANS AND PARTS, TOGETHER WITH THEIR FUNCTIONS, OF THAT USEFUL AND BEAUTIFUL ANIMAL.

And also,
Comprising a View of the *Diseases* and *Injuries*, with their Symptoms and Modes of Cure, to which the several Parts are liable.

1556

Together with a
Concise Examination of the Economy & Structure

OF

THE FOOT,

AND

OBSERVATIONS ON SHOEING.

BY B. W. BURKE.

London:

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1806.

2152

PREFACE.

NUMEROUS publications have lately appeared on veterinary medicine, which certainly have rendered great services to the public, and also to the poor animal which is the subject of them; by helping to explode an old, futile, and barbarous practice, and substituting in its room one founded on the known laws of the animal economy, and the properties of medicines, as these are proved to affect the horse*. But though much has been thus achieved towards rescuing a noble and useful creature from a practice more destructive than unperverted disease; yet for the want of a proper view of the part, accompanying the description of the symptoms, and modes of cure, of the dif-

* Such medicines as are proved by experiments to be inert in the horse, and consequently useless, are excluded from the formulæ of the subsequent work.

ferent disorders and injuries to which the horse is liable; a sufficient light was not afforded to show clearly the reason and grounds of the practice recommended.

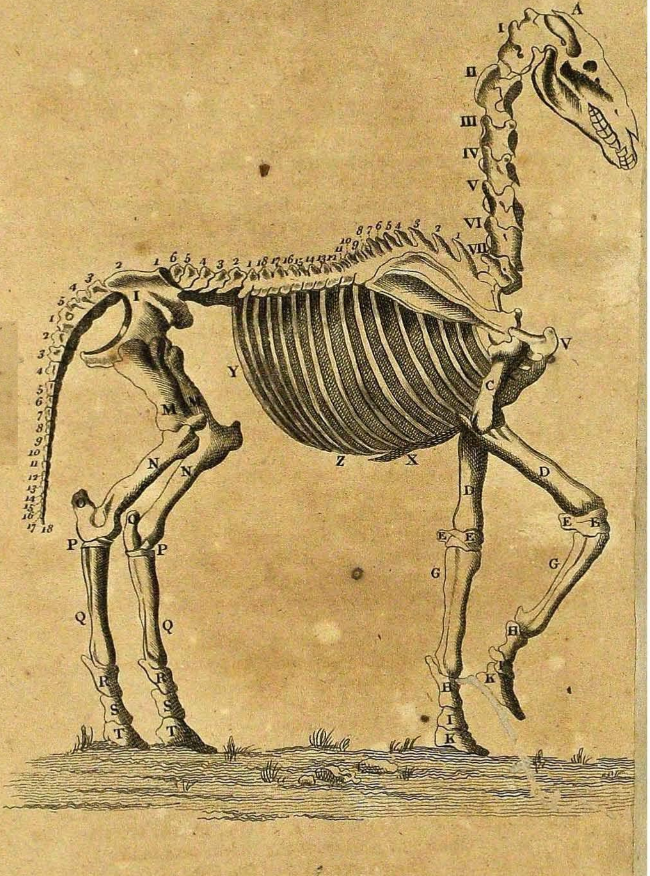
In some degree to supply this defect, is the object of the present volume. The anatomy and physiology, or natural history of the horse, will be found to be continued in regular succession; commencing with the bones; including all his internal organs and parts; and ending with the hair, or most external covering of the body. While the history, and modes of cure, of the different diseases and accidents injuring him, are subjoined, each to its respective part or seat; so that the reader may, at once, see, in his acquaintance with the nature of the part itself, the reason of the particular symptoms it may exhibit under disease, and also the propriety of a particular mode of cure; and of both of which he must have remained ignorant but for his knowledge of the structure and economy of the organ affected

This arrangement also, by introducing the reader to a familiar acquaintance with the organization of the horse, cannot fail to show him the absurdity of many parts of the old practice, and to convince him of the rationality of the treatment and modes of cure recommended by modern practitioners. But whilst this little work is avowedly written for these purposes, the writer is candid to confess, that to effect them completely would require a much larger and more expensive publication, illustrated with a more copious set of plates, and which would be incompatible with the design of these sheets, which is, that they may serve as an useful manual to the public, rather than an elaborate and complete work, accessible only to the affluent few.

To the student in the veterinary science, this little volume may not be unacceptable, in enabling him to pursue his studies with greater ease and rapidity. In the hands of other medical students

it will serve as a concise tract in this branch of comparative anatomy, &c. Whilst practitioners in veterinary medicine, who are unacquainted with the structure of the horse's frame, and therefore certainly treat diseases without knowing on what grounds they proceed, will reap much advantage by perusing it.

Plate 1.



London, Published by J. Johnson St. Paul's Church Yard Feb. 1. 1806.

DESCRIPTION OF THE PLATES.

PLATE I,

SHOWING THE SKELETON OF THE HORSE.

A. The head, including all its parts as articulated with the neck.

B B. The blade-bone, or scapula.

G. The humerus, or shoulder-bone.

D D. The bones of the leg, or fore-arm, consisting in each of the radius and ulna.

E E. The joints of the knees, with the small ranges of bones.

F F. The posterior parts of the knee-joints.

G G. The shank-bones, consisting in each of the cannon bone, and the two metacarpal, or splent-bones.

H H. The great pastern bones, with the two sesamoid bones of each fetlock.

I I. The lesser pastern bones.

K K. The bones of the feet, consisting in each of the coffin and navicular bones, with the lateral cartilages.

L L. The bones of the pelvis, called ossa innominata.

M M. The thigh-bones.

N N. The bones of the hind-legs; consisting in each of the tibia and the fibula.

O O. The points of the hocks.

P P. The small bones of the hocks.

Q Q. The bones of the insteps; consisting, in each, of the cannon bone and two metatarsal bones.

R R. The great pasterns and sesamoid bones of the hind-legs.

S S. The little pastern bones of the hind-legs.

T T. The coffin and navicular bones of each hind-foot, with the lateral cartilages.

V. The sternum, or breast-bone.

X. The point of the sternum.

Y Y. The ribs.

Z. The cartilaginous ends of the ribs on the breast and abdomen.

I. II. III. IV. V. VI. VII. The seven vertebræ of the neck.

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. The eighteen vertebræ of the thorax and back.

1. 2. 3. 4. 5. 6. The six vertebræ of the loins.

1. 2. 3. 4. 5. The five spines of the os sacrum.

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. The eighteen joints of the coxendix and tail.

PLATE II,

Representing the intestines of the horse as they appear in their natural situation, when the abdomen is laid open.

AAAAAA. The colon, with its various circumvolutions and windings, together with its numerous folds, and under which lie the small intestines.

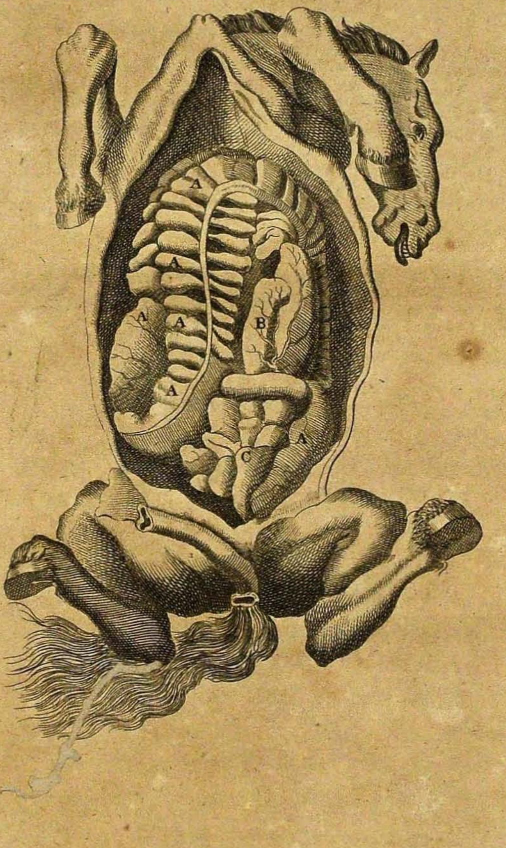
B. The cœcum, or blind gut.

C. The rectum.

TO THE BINDER.

Place this between the two Plates, after the Preface.

b



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A COMPENDIUM, &c.

A VIEW

OF THE

EXTERIOR OF THE HORSE.

THE different parts composing the exterior of a horse, have some names in common with other animals, but others that are peculiar to him; and as there may be readers who are unacquainted with these peculiarities, we shall describe the external parts of the horse in the following separate article.

First, then, the head consists of several parts; as the eyes, ears, nose, mouth, &c. The two hollows above the eyes, and which are deepest in old horses, are called the eye-pits. The forehead is frequently termed the brow; and that part of the head which is the most backward, is called the pole. The lips, including the point of the nose, constitute the muzzle; and the long, scattered hairs growing on the under lip, to some distance behind, are named the beard. The in-

side of the mouth, between the lower-jaw bones, where the tongue is lodged, is called the channel; and the fleshy rows running across the upper part of the mouth, and which are very distinguishable in young horses, are called the bars; they extend nearly to the palate.

The neck reaches from the head to the shoulders. The hair which grows along the upper part of the neck, is called the mane; and the part that is the most arched, the crest: in a horse full of vigour, the crest appears semicircular; but when the animal is out of spirit, or impoverished, his neck sinks, and he is said to be crest-fallen.

The withers is the part rising upon the top of the shoulders, and is formed by the highest spines: it is from the top of the withers a horse is measured to determine his size.

The reins extend from the withers to the hind-part of the back.

The loins are next the reins, and reach to the croup; and where the crupper lies is termed the channel. The croup extends from the reins to the dock, and includes all that descent which goes to the tail.

The carcass means the body of a horse, which, when compact and well made, the animal is said to be well carcassed.

The parts at each side below the reins, and reaching from the short ribs to the haunches, are called the flanks. And the belly extends from the breast to the sheath.

The shoulders enclose the whole breast on both sides; beginning from the withers, and reaching downwards to the fore-legs or arms.

The arms commence at the shoulders; and the hind-part pointing posteriorly is called the elbow. Each fore-leg or arm reaches to the knee.

The shank is that part which reaches from the knee to the pastern: where these parts meet, is called the great pastern or fet-lock joint. The pastern has another joint, distinguished by the title of the lesser pastern joint; and then extends to the foot: its junction here is termed the coffin-joint.

The foot consists of the external and internal parts: the former comprises all the outside, horny, and insensible portions, covering and enclosing, as in a case, the internal sensible foot; and it is distinguished into the crust, sole, bars, and frog. The internal, sensible foot, is composed of several parts; it is contained within, and defended by, the former; but for a more particular description, we refer the reader to the article on the foot.

Belonging to the hind parts of a horse, are his haunches: they commence at the termination of the loins, and descend at each side to the hock.

The stifle is that part of the thigh which projects towards the horse's belly, when he is in the act of bending his leg: it is the knee-pan of a horse.

The whirl-bone is the upper extremity of the thigh-bone, articulated with the bones of the pelvis.

The thigh begins at the stifle, and reaches to the bending of the ham or hock.

The ham is the bending of the hind-leg: the round knob, or point behind, is termed the heel of the hock, and is the part into which the tendon of Achilles is inserted.

The small of the fore-leg being called the shank, the small of the hind-leg is termed the instep.

The pasterns and feet behind have also the same names as before.

We shall now proceed to give a sketch of the organization of the horse; first, however, observing that the right side of a horse is always called his off-side, and his left the near-side; the latter being that to which we always approach when we go to mount or handle a horse.

GENERAL SKETCH

OF THE

ORGANIZATION OF THE HORSE.

FOR the reader to be impressed with just notions of the reason and use of the different organs and parts entering into the structure of the horse; and that he may commence the following description with a general and commanding view of the subject, it is necessary to observe,—first, that life, as we see it enjoyed by the animal, is the result and design of the formation and joint operation of all the organs and parts constituting the frame of the horse: and secondly, that the function carried on by each separate part, and consequently the part itself, was intended, and is necessary, to contribute to the completion of the above general result. This will be illustrated in the following sketch.

First, then, the bones are essential to sustain the rest of the animal machine; to give it dimension and figure; to preserve the situation of some of the viscera; to afford fixed points and also levers

to the muscles, in their various movements; and to protect from external injuries, the more delicate and important organs of the frame; as the brain, lungs, &c.; all which offices the bones, from their hardness, size, and shape, do actually perform.

And, as one continued bony structure, though answering most of the above purposes, must necessarily preclude motion, we see the bones are divided into several pieces, admitting of moveable joints.

But these different bones require to be firmly connected together, so as to be secured against dislocation: and this aim is accomplished by what are called the ligaments. They are of two kinds: one sort passes from the extremity of one bone into the opposite end of the other, connecting, in the manner of a cord, the two bones together; while the second kind comprises the whole joint as in a purse, and is therefore called "a capsular ligament."

To prevent friction and concussion in the various movements of the body, and which would be apt to produce injury and inflammation; and also to render these movements pleasant and easy, the extremities of the different bones, where they move upon and rub against one another, are covered with smooth, slippery, and elastic sub-

stances, called cartilages. They are to be found on the heads of all bones entering into moveable joints; and that they may the more effectually answer the purpose for which they were intended, their surfaces are kept constantly moist by an oily secretion exuded within the joint.

Now, to effect motion in the animal frame, to carry on the movements immediately necessary to life, and also to accomplish the voluntary actions, it is requisite there be given motionary organs to the creature. For this purpose, then, the muscular or fleshy fibre is actually bestowed. It is this fibre, entering into the composition of the vital organs, as the heart, stomach, intestines, &c., which wholly executes their respective motions: and it is this fibre also, composing the muscles, and which are principally made up of these fibres, connected together in bundles, which, in like manner, accomplishes all the other actions of the frame.

But, as it is fit that the actions of a creature should be such as are calculated to produce its well-being and happiness, so the Supreme Architect has bestowed upon the horse certain mental faculties, for the purpose of enabling him to discriminate and to choose the actions he should perform. These faculties, constituting the mind of

the animal, require an appropriate organ for their operation; and such really is the use and intent of the brain, in which the mind resides, to direct and govern the whole system.

The mind, again, having the charge of the corporeal frame, and this being in constant correspondence with material objects around, it is requisite that there be organs so constructed as to receive the different impressions which these objects may make: and accordingly we find the eye is impressed by light, the ear by sound, the nose by smell, the mouth by taste, and the skin by feeling.

And that these impressions may be transmitted to the mind in the brain, for the information of the former, and also that the mind may be enabled to send its commands and influence to all the parts of the frame, it is necessary that proper organs of communication exist between the brain and the rest of the machine: and, in fact, the nerves answer these purposes: they are white, soft chords, arising from the brain and spinal marrow; and are distributed in pairs, which afterwards branch out into innumerable small ramifications, over the greatest part of the body. They convey all the different kinds of sensations to the mind in the brain, and likewise carry out

from thence all its commands and influence to the other parts of the frame.

Life, however, depending on certain properties contained in the atmospheric air, and without which, existence in most creatures must soon cease, as is proved by experiment, an apparatus was essential for extracting these properties and yielding them to the animal. Accordingly, we see the lungs are given: they are two cellular spongy bodies, occupying the cavity of the chest; and communicate by a cartilaginous tube with the mouth and back part of the nose. The air passing in at these openings, in breathing, descends along the tube into the innumerable cells formed in the lungs; where being brought sufficiently close to the blood, which is also sent into these organs for the purpose, the latter fluid absorbs from the air the vital properties it contained; and thus enriched, it returns into the circulation to distribute life and energy to all parts of the machine; while the remaining portion of the air, now deprived of its principle of vitality, and therefore useless to the animal, is expelled in expiration, to make room for a fresh supply.

But this principle of vitality, derived from the air, and without which existence could endure but for a few minutes, is not sufficient of itself to

sustain life constantly. The living machine is incessantly in action, and therefore liable to be worn; and if no provision was made for repairing the waste it suffers from its own movements, and the injuries it receives from abroad, it must soon run into decay, and be totally destroyed solely from exhaustion. To preclude this event taking place prematurely, and to preserve the healthy condition of the creature, a store of blood is collected in the heart and vascular system, abounding with nutritious particles, and fluid enough to circulate to the minutest parts of the frame. Propelled by the heart, and conveyed by the arteries, this fluid flows to every part; rebuilds what was worn; replenishes where there was exhaustion; repairs the part that was injured; and collects and sweeps away the old and useless materials: and having rendered these offices to the different parts of the system, the remaining blood is returned by the veins to the heart, that it may be enriched and prepared for again circulating over the body. And hence we see the use and necessity of the circulation of the blood.

The worn out, useless particles, which were swept along by the current of the blood, must not be kept in the frame, but must be separated and expelled from the system. For this purpose,

partly, are the glands given: they have the power of secreting from the blood the redundant water and other bodies which may irritate and injure the sensible organs: and after these useless or injurious particles are strained off by the glands, they are conveyed out of the frame by the excretory vessels. But another and principal use of the glands, and which is not less admirable than astonishing, is their elaborating from the mass of blood, and which appears like one homogeneal fluid, various and different secretions for effecting important purposes in the animal economy, as shall be hereafter seen.

Now the action and consequent wearing of the animal machine being incessant, the reparation must be as constant, to supply the waste: and as this reparation is drawn from the blood, circulating over all the parts of the body for the purpose of affording it, even this provision must soon be exhausted, and the frame be destroyed, if there were no means provided for obtaining fresh supplies. These supplies we see profusely scattered around in the vegetable world; but it is necessary they be considerably changed and converted into blood for increasing the store of this fluid. The animal, therefore, is provided with teeth for cutting and bruising the food, and with a stomach for

melting it down; and, in short, with all the organs essential to digestion. The nutritious parts of the aliment only can be useful in the frame: these must be taken up, and conveyed into the blood, and the dregs must be thrown off. With this view the intestinal canal is actually given; it separates the part which we call chyle, to be joined to, and assimilated with, the blood; for recruiting the system; while the fœces pass backward, to be conducted out of the body.

Further, the interstices of the different parts composing the frame of the horse, require to be filled up with some soft, pliable substance, which shall unite them, and, at the same time, assist their movements over each other; and these ends are perfectly accomplished by the cellular membrane and adipose substance.

And, finally, the whole frame must have an external covering, both to give it compactness and to protect it from injuries; and, accordingly, the horse is furnished with the skin, and other integuments; the peculiar structure and properties of which shall be hereafter explained.

The animal is now described, with all the requisites not only to his immediate existence, but also for prolonging life to an indefinite length of time: but as it is the nature of all material beings,

to begin, after a limited time, to decay and fall into final ruin, so each species of creatures must shortly become extinct, if a plan of re-production did not exist; accordingly the Creator has made animals male and female, and endowed them with such organs and passions as are fitted to effect propagation to the end of time.

OF THE BONES, WITH THEIR APPENDAGES.

Prior to entering on the particular description of the bones of a horse, it will be necessary to observe generally their nature and composition. It was seen in the general sketch of the horse's organization, " that, to support, to give firmness and shape to the animal fabric, to keep the softer parts in their proper places, to give fixed points for, and the proper direction to, its motions, and to protect some of the more important and tender organs from external injuries, it was necessary there should be some firm prop-work interwoven through the whole; and that, in fact, for such purposes the bones were given."

But, though the bones are enabled to perform these functions by their peculiar hardness and solidity, properties which, in appearance, make them approximate to dead, inorganic matter; yet it must

not be supposed that they are without their vessels and nerves. Organization was indispensable to their creation and growth, and will continue so to be, while the animal is in health. All the bones had, at one time of the embryo, been merely a gelatinous substance; gradually this substance becomes hard, but it is not until a considerable time after birth, that all the bones of an animal arrive at their full strength and solidity. And hence we may account for the bony excrescences called splents, ring-bones, spavins, &c., which so frequently take place in young horses that are ridden about three years of age, and before their bones acquire a consistence sufficiently firm to endure the straining and pressure of premature exertion.

The process of ossification, or formation of bone, takes place in the following manner:— first, cartilage is laid in place of the future bone: this cartilage is never hardened into bone, as has been erroneously supposed, but is itself removed by absorbing vessels; while the true bony matter is deposited in its place by the proper vessels. Thus there are two actions requisite to the formation of bone —absorption, for the removal of the cartilage, and deposition of bony matter for forming the new bone. This process of ossification commences in the centre of each cartilage, and continues to

extend till the whole bone is produced. But it is completed in some particular bones sooner than in others: flat bones, for instance, are sooner ossified than cylindrical ones; and the coffin bone, before the pasterns. And it should be here observed, that ossification is much sooner completed in quadrupeds than in man; for the former being intended to move from place to place immediately after birth, require their bones to be sooner formed, and really have them so, as is seen in the pelvis of a foal, which is completely ossified at birth; whilst in man, ossification is not complete before his twentieth year.

When bones are formed, the same process of change of parts, by absorption and deposition, continues as it had done in the young animal. This constant changing of old for new parts, is absolutely necessary to the health of the bone, and is demonstrated by feeding animals with madder alternately with other food; when, if after death you saw their bones through, these shall be found to consist of red and white strata, according to the intervals of which the madder and other food had been given.

Bones are subject to disease, particularly inflammation; and some bones are more liable to it than others, as the small internal metecarpal and

metetarsal bones. Bones frequently become dead; when the dead part is removed in the following manner:—Acting, at first, as an extraneous substance on the surrounding living bone, it excites inflammation; absorption next follows, removing the living parts in contact with the dead bone; when a line of separation between them being thus formed, fresh granulations at the same time arise, and thrust out the dead, detached portion.

The bones of a horse are not so liable to be fractured, as are those of the human subject; but when broken, they are much more difficult of cure, owing to the inconvenience and almost impossibility of keeping the animal sufficiently at rest, till a re-union of the broken bones take place. This union is effected in the following way:—first, blood escapes and forms a coagulum, which serves as a nidus for the arteries of the bone to shoot into and deposite bony matter; this matter, in a certain time, becomes complete bone, uniting the broken ends together, and being generally larger and stronger than any other part of the bone.

The hardness and solidity of bones, and which enable them to perform their peculiar functions in the animal frame, depend upon the great quantity of calcareous earth of which they are composed. This earth is deposited in membraneous cells, and

may be separated by marine acid, so that only the membrane shall remain; and it is owing to their earthy composition that bones have generally a white colour, and are not so subject to putrefaction as other animal substances.

OF THE PERIOSTEUM.

The periosteum is a strong, tendinous membrane, which covers the bones, and serves for the insertion of muscles and their tendons. It has few nerves, and is consequently scarcely sensible in a healthy state; but when diseased, its sensibility becomes increased, and the most acute pain is produced. This is the case in splints and spavins; for, in these diseases, the bone beneath enlarging, presses forcibly against the periosteum covering it; and this membrane being inelastic, and consequently incapable of expanding, violent pain, attended with lameness, takes place.

This membrane, when covering the bones of the skull, is called pericranium; and when on cartilages, perichondrium: it is of a white colour in animals after death, but in the living subject it is red, and much more vascular than tendon.

OF CARTILAGES.

Cartilages are another appendage to bones, and serve many useful purposes by their smooth and

elastic properties. First, they form the extreme and prominent parts of the body; such as the nose, ears, &c.; and which, from being composed partly of cartilage instead of bone, are better enabled to resist injuries. The ribs, also, are cartilaginous in that part of them connected with the breast bone, and which is most exposed to injury and violence. Secondly, in the fœtus, cartilages supply the place of bones; and the reason, perhaps, is, that as young animals are very liable to falls and other accidents, they must necessarily have materials of an elastic and yielding nature in place of bone; and hence we seldom meet with fractures in the bones of young children, because they are still, in great part, cartilage. There are cartilages in the foot of the horse, which are intended to act as a spring, and, by their elasticity, to prevent concussion.

The third kind of cartilage is more universal than any of the rest, and is intended to prevent friction between the ends of bones, by being interposed where they form joints. In this case, the cartilage itself is covered by a firm membrane, called perichondrium, and which performs the office of a gland in secreting a fluid termed synovia: this fluid is really what precludes friction in the joints; for, by its continually covering the membrane by which it is secreted, it necessarily pre-

vents the surface of that membrane from coming into contact with the opposite one. These cartilages are, as we have said, yielding and elastic; they carry no red blood, nor has any fluid been yet injected into them; but they have a small number of vessels, with a transparent fluid, and this is seen in the jaundice of the human subject, when the cartilages become yellow. They neither ulcerate nor exfoliate, nor do they ever granulate. They possess no sensibility; their nerves, if they have any, not being yet discovered: but the membrane covering them is both sensible and vascular. These properties are peculiar to this last kind of cartilage only; for the other classes are subject to disease, in consequence of which they become ossified.

OF LIGAMENTS.

The *Ligaments* are substances which connect and tie the bones together: they are inelastic, and but little vascular: they, however, are covered by a membrane, which has several vessels, and which is similar nearly, in structure and use, to that of the cartilages of joints. The ligaments of a horse are not so liable to disease as those of the human subject are, but they frequently meet with injuries by the ends of the bones forming a joint, pressing

forcibly upon them when the animal makes a false step; in this case the horse is said to be sprained.

The ligaments of the horse are liable to be wounded, which often proves dangerous, from the synovia of the joint escaping, and the air insinuating itself into the cavity. The object then should be to shut up the opening that has been made into the joint; for as long as it remains unclosed, the synovia will flow out, friction will then take place, and the inflammation increasing, the pain will at length become so violent as to produce a symptomatic fever, which frequently ends in death. The most effectual method of closing the wound, is by applying the actual cautery to the lips of the opening: by this treatment coagulable lymph will be thrown out, so as to shut up the cavity of the joint, and to prevent the further flow of synovia. But should the first application of the actual cautery not be sufficient, and that more synovia escape, the operation is to be repeated, and inflammation is to be guarded against, by bleeding and purging.

OF THE MARROW.

Marrow is also another appendage belonging to bones; it is contained in a membrane within the cavities of the bones, and is secreted from arteries.

which are seen entering the bone for that purpose. Formerly it was supposed the marrow possessed sensibility, but now that idea is deservedly exploded, it being impossible to trace any nerves into it; but though the marrow is itself perfectly insensible, this is not the case with the membrane containing it, which is supplied with nerves, and is consequently sensible.

The marrow was, at one time, thought to serve as nourishment to the bones, but this opinion is now also exploded; and it is supposed, with more reason, that it performs the same offices as the fat, in being absorbed when there is occasion for it to supply the animal.

OF THE

SKELETON*.

ALL the bones of an animal, when connected together, as in the living state, are called a skeleton; and are generally divided, in description, into the head, trunk, anterior and posterior extremities.

OF THE HEAD.

The head of the horse is so generally known as to shape, as not to require a particular description; it includes the bones of the skull, and also those of the face.

THE SKULL.

The skull, or brain-case, for lodging and defending the brain, is composed, as in the human subject, of eight bones; six of which are said to be proper or peculiar to the skull, and two common to it and the face. They are, the frontal or forehead-bone, which forms the brow; and in

* See the plate of the skeleton.

colts, and many other young animals, is divided by a seam down the middle, but which in time wears out: the two side bones, called the parietal, and which are divided by a seam reaching along the middle of the head, from the forehead to the occipital or noll-bone; these are small in a horse in proportion to what they are in man, the greatest bulk of a horse's head lying forward; the occipital bone forming the upper and hinder part of the head, and the two temporal bones constituting its lower sides. The two bones common to the skull and face, because helping to compose both; are the sphenoid and ethmoid bones: they are situated in nearly the centre of the base of the skull; are of a very irregular shape, and assist in forming the orbits of the eyes, and also the back of the nostrils.

SUTURES.

The bones of the skull are joined together by indented seams, called sutures: this kind of junction is owing to the manner in which ossification takes place in these bones; for in the fœtus the bones of the skull are perfectly distinct from each other, which is best calculated for the growth of the brain it encloses. The ossification begins in the middle of each bone, and proceeds gradually

to the circumference. Hence this process, and of course the increase of the head, is carried on from a great number of points at the same time, until the growing edges of the bones meet; when the projecting fibres of one bone force themselves between those of the opposite bone, and constitute that indented line which we may so plainly perceive on most skulls.

She skull of a horse is much smaller than that of a man, its capacity for containing brain being not one-fourth as great; but the bones which compose it are thicker and stronger than those of the human subject, and consequently better able to resist blows and other accidents.

BONES OF THE FACE.

The face of the horse, like that of the human skeleton, is divided, for sake of description, into the upper and lower, or rather (in the horse,) posterior jaws. The upper jaw is composed of thirteen bones, exclusive of the teeth: of these, six are placed on each side of the maxilla superior, and one in the middle.

The bones, which are in pairs, are the two nasal bones; two ungular ones; two cheek-bones; two superior maxillary; two inferior maxillary; two palatine bones; and a single one, the vomer.

The two nasal bones are very unlike those of the human subject, being of a wedge-like figure, sharp below, and broad above: they also differ from those of the human face; in this, that they are considerably larger for increasing the capacity of the organ of smell, and which is much more acute in the horse than in man. The ungular bones are situated at the inner sides of the orbits, which they help to compose. Each of these bones has an opening through it for the passage of the tears from the eyes into the nose. The cheek-bones are each connected in the orbit to the ungular bone just described; and to the superior maxillary; and its zigomatic process bends over to join that of the temporal bone, and form the bony arch of the cheek. The superior maxillary bones form, along with the cheek-bones, the ridge which is observable on the cheek of the living subject, and are connected with most of the other bones of the face. The inferior maxillaries are connected superiorly, in a curious manner, to the superior maxillaries and nasal bones: they help to complete the bony palate, and afford sockets for some of the teeth: they are separate in the young animal, but completely joined in the adult. The palatine bones are situated the most superior of the bony palate, and are connected to the su-

perior maxillaries, vomer, sphenoid, and ethmoid bones. The vomer differs much from the human vomer, being much longer in the horse; it is concave anteriorly, for the insertion of the cartilage which divides the nose.

THE POSTERIOR JAW.

The *posterior jaw* differs from the upper in this, that the former is moveable, being articulated at each extremity with the temporal bone of that side.

In young animals it is divided between the foreteeth, so as that the bones may be easily parted asunder. This bone affords sockets for the lower-teeth; and is liable to a disease, from the pressure of the bit on the soft parts, producing inflammation and suppuration, which extends to the bone, and forms sinuses to a considerable length.

OF THE TEETH.

The teeth are bones of a particular structure, formed in the horse, for the purpose of mastication chiefly. It will be necessary to consider their composition and figure, their number and arrangement, and the time and order in which they appear; and in observing the latter, we shall

point out those changes which are the leading marks for knowing the animal's age.

In each tooth we may distinguish a body, a neck, and a root or fangs. The body of the tooth is that part which appears above the gums: the root is fixed into the socket, and the neck is the middle part between the two. The teeth are composed of two substances; viz. the enamel and the bone. The enamel is a white and very hard and compact substance peculiar to the teeth; it is thickest on the grinding surface, and becoming gradually thinner, terminates insensibly at the neck of the tooth. The bony part, which composes the inner substance of the body, neck, and root of the tooth, resembles other bones in its structure, but it is much harder than the most compact part of bones in general.

In each tooth we find an inner cavity, into which enter an artery, vein, and nerve, for the nourishment of the part. The periosteum surrounds the teeth from their roots or fangs to a little beyond their bony sockets, where we find it adhering to the gums. This membrane, while it encloses the teeth, serves at the same time to line the sockets, so that it may be considered as common to both. The teeth are likewise secured in their sockets by means of the gums; a red, vas-

cular, firm, and elastic substance, that possesses but little sensibility. The number of teeth in both jaws of a horse arrived at maturity are forty; viz. twelve front teeth, called incisóres or nippers; twenty-four molares or grinders; and four canine teeth, which are called tushes: these last are wanting in the mare, except in some very few instances.

OF THE HORSE'S AGE.

The first teeth that appear are called foal-teeth or suckers; they are twelve in number, viz. six above and six below, and are easily distinguished from the teeth that come afterwards, by their smallness and whiteness. When a colt is between two years and a half and three he sheds the two middle teeth of the lower jaw, and also of the upper jaw: from three years and a half until four, he sheds the two next in both jaws: and from four and a half until five, he sheds the two corner teeth of both jaws; and at the same time, the canine teeth or tushes make their appearance. He is now no longer called a colt, and his age from five years until seven is to be determined by a small black cavity resembling the eye of a bean, in the upper surface of the teeth of the lower jaw, in the following manner:—at five years old,

the black marks or cavities in the two middle teeth of the lower jaw are filled up, and nearly disappear. At six years old the black marks of the two second teeth are filled up in the same manner. At seven years old, until eight, the marks of the corner teeth of the lower jaw fill up and disappear: and at the same time the tushes, which before this period were concave on the surface next to the tongue, alter their shape, and become round or convex.

The marks being now obliterated in the lower teeth, the horse is said to be aged; nor can it be exactly known by his mouth how old he may be: there are appearances, however, which are sure proofs of great age, as the extreme length and curvature of the upper fore teeth, owing to the wearing away of the gums at the roots; also the yellow or brownish colour of these teeth, and their projecting considerably over the under ones: and, finally, the disappearing of the bars of the mouth, and the sinking in of the eye-pits.

OF LAMPAS.

The bars, which are transverse ridges crossing the roof of the horse's mouth, sometimes grow level with the front teeth, and even project beyond them: in this case they are apt to impede

the animal's feeding; in consequence of which, they are usually burned down. An easier and less painful operation, however, will be equally efficient; viz. incise the bars gently with a lancet, and allow them to bleed, by which they will generally be decreased.

THE TONGUE-BONE.

Before we come to describe the bones composing the trunk, it will be necessary to mention one, which, from its situation and functions, should follow the description of those of the head.

The os hyoides, so called from its resemblance to the Greek letter υ upsilon, is situated at the base of the tongue, several of whose muscles are connected with it, and to which, in its several movements, this bone serves as a fixed point: it also supports the muscles acting on the larynx and fauces.

OF THE TRUNK OF THE HORSE.

The trunk of the horse's skeleton consists of the spine, the thorax, and the pelvis.

THE SPINE.

The spine is that long chain of bones reaching from the back of the head to the end of the tail:

it is divided into numerous pieces for the purpose of motion, and has several projecting points, called processes, for the origin or insertion of muscles; and which act as levers to these motionary organs, in the different movements they perform.

The bones forming the spine of a horse are seven cervical, eighteen dorsal, six lumber, five sacral, and from thirteen to sixteen belonging to the tail. Each separate bone is called a vertebra, because, notwithstanding their strong connexion together, they yet admit of motion; and it consists of a body, which, with the others, constitutes the main line and strength of the back-bone; of processes or projections which serve as so many handles and levers for the working of the numerous muscles that are inserted into this bone; and of an opening, formed by the junction of these processes at the superior part of the spine, for the lodgment of the spinal marrow.

The first vertebra of the neck, called atlas, from immediately supporting the head in the human subject, differs in its figure from all the rest; its anterior surface, in the horse, is immediately articulated with the occipital bone of the head; and it contains a large hole for the passage of the spinal marrow.

The second vertebra of the neck also differs

from all the others, and is called *dentata*, from having a tooth-like process shooting forward from its anterior surface, and on which the first vertebra, and consequently the head, has a rotatory motion: there is a space between the first and second vertebræ at their superior part, which is covered only by the ligament of the neck, and not protected by any bone, where the spinal marrow beneath may be easily punctured and the animal quickly destroyed. The other vertebræ of the neck take on them the general appearance of all the rest, and are admirably calculated for supporting weight, and affording levers for the insertion of the surrounding muscles.

The eighteen dorsal, or vertebræ of the back, differ from the others in having their spinous processes considerably longer, and also being articulated with the heads of the ribs. From the first to the fifth vertebra of the back, the spinous processes increase in length, but after that they gradually decrease. This formation of the processes is particularly useful in the horse, and adds greatly to his beauty; for, when the first five processes do not rise sufficiently high, the muscles inserted into them have but short, imperfect levers to work by, and the horse wants both beauty and strength: when, also, the succeeding spinous processes of

the back become suddenly short, the horse is said to be hollow-backed, and is found to be weak; and, on the other hand, should these succeeding processes be too long, the animal is then termed roach-backed; which, though diminishing beauty, adds to the strength of the horse, by limiting the motion of these parts.

The six lumbar vertebræ differ from the rest, in their transverse processes being comparatively much longer: these bones are often diseased in old horses, and are found, after death, to be completely grown together, although no inconvenience was perceived during the animal's life.

The sacral bones are five in number; they are distinct in the fœtus, but, in the adult, united: they enclose the continuation of the spinal marrow in a canal within their bodies, and have two rows of openings on their surfaces for the transmission of nerves. The os sacrum, as these bones are called, is concave on its inferior surface, and very smooth, so as to be adapted to the contents of the pelvis, (which this bone helps to form,) but particularly the rectum, which lies in immediate contact with it.

The bones of the tail admit of great variety in their number, in the horse; fluctuating between eighteen and fifteen, which last is the most com-

mon number: their use is to afford an attachment for muscles; the four first have spinous and transverse processes, and the rest taper gradually till the last bone is not the tenth part of the size of the first: about the fourth or fifth, terminates the continuation of the spinal marrow, and therefore the remaining bones have no hollow for constituting a canal for its lodgment.

The bones of the spine are connected together by strong ligaments, and have cartilages interposed between their bodies, for preventing concussion and admitting freer motion. And the canal which they afford for containing the spinal marrow, is completely lined by membranes, which shall hereafter be described, so as safely and fully to enclose its delicate contents.

OF THE THORAX.

The thorax, or chest, for containing the lungs, heart, &c., is composed of the dorsal vertebræ (already described,) at the superior part; of eighteen ribs at each side, which make up its lateral parts; and of the sternum or breast-bone inferiorly.

The ribs extend from the back-bone at either side, down to the sternum; and are divided into the true and false ribs: the true ribs are those

whose cartilaginous ends are directly connected with the breast-bone: the false ribs have also cartilages at their extremities, but instead of running immediately to the sternum, their ends communicate with one another, excepting the two posterior ones, which are neither connected between themselves or with the breast-bone. Each rib consists of a head, which is articulated by means of a capsular ligament with the spine; of the body, or that part lying between the head and neck of the rib, and its cartilaginous extremity; and of this extremity itself. There is a furrow on the posterior edge of each rib, along which runs the intercostal artery; and both edges exhibit a concavity for the insertion of the intercostal muscles. A though the ribs are rough exteriorly, owing to the attachment of numerous muscles, their internal surface is concave and smooth for lodging and defending the lungs and other viscera.

The curvature of the ribs varies materially in different horses, and perhaps on no other point do the excellency and beauty of the animal so much depend. When a horse, therefore, has his ribs so much curved as to form a circle, the presumption is, that the lungs are good, have a free play, and are not very subject to disease: and the same holds good with respect to the abdominal viscera; the animal is kind; that

is, he eats well; is always in condition; and also is capable of supporting greater weights: while, on the other hand, a horse having points the reverse of these; that is, having flat sides, the ribs approaching nearer each other, especially the first pair of ribs; is said to be narrow chested, and certainly possesses different properties from the former. In this case, he can neither bear so much weight, nor does he feed as well; he is also more liable to internal inflammations, and, when he runs hard, has a tendency to roll, in place of moving straight forward: and it is a fact, that the breed of such horses will partake more or less of the properties of their progenitors: they will be flat-sided, narrow-chested, and bad eaters.

The chest inferiorly is formed by the sternum or breast bone. This consists, in the horse, of six, and sometimes seven distinct bones, all of which have a considerable quantity of cartilage interposed between them. It is with this bone the cartilaginous extremities of the nine true ribs at each side directly communicate, to complete the chest.

OF THE PELVIS.

The pelvis of the horse differs considerably from that of the human subject; in being comparatively larger, and the os sacrum not so curved as in the

latter. This variation seems to be owing principally to the erect posture of the human subject, and the horizontal one of the horse; for the great curvature of the sacrum considerably diminishing the cavity of the pelvis in the former, helps to sustain the contents of this cavity, and which otherwise would be liable to pass downwards by the force of gravitation; while in the latter this precaution is unnecessary, owing to the horizontal position of the animal's body. This difference of structure accounts for the ease with which female quadrupeds bring forth their young; for the bottom of their pelvis being comparatively wider than it is in the human subject, the passage is also comparatively larger; and hence, it seldom happens that the mother expresses any pain, or that herself or progeny are destroyed in the course of delivery.

In the horse, however, as in man, the pelvis is composed of the os sacrum, (already described), and of what are termed the ossa innominata: these consist of six bones, three of which are placed on each side of the pelvis, and correspond with the three opposite ones. The three bones of which each os innominatum is formed, are the ilium, ischium, and pubis. These bones, in the fœtus of five months old, are still separate; but they are firmly united and completely ossified at

birth, not only in the horse, but also in oxen, sheep, and other animals. The reason of this is, that quadrupeds may be enabled to accomplish active motion soon after birth; while with man, whose economy in this respect differs, the bones of the pelvis are not completely united and ossified until his twenty-first year.

The ilium, or haunch-bone, constitutes each anterior and superior side of the pelvis of a horse; the ischium, or hip-bone, the posterior part of each side; and the os pubis, or share-bone, conjointly with its fellow, the inferior portion. These three bones assist to form the acetabulum, which is a hollow for receiving the head of the thigh-bone; and that the motion at this joint may be rendered free from concussion and other injury, the greatest portion of the concavity is lined with a smooth cartilage. There is, however, at its inner part, a little depression for containing the mucilaginous glands of the joints, and which are intended to supply the loss of moisture by friction in movement.

OF THE ANTERIOR EXTREMITIES.

THE SCAPULA.

The first bone of each anterior extremity is the scapula, or blade-bone, which lies like a shield on

either side of the chest, and extends from below the withers to the point of the shoulder-bone. It has a high spine or ridge along its middle on the outside, and is joined to the ribs by its muscles. The lower end of this bone has a slender cavity for receiving the round head of the shoulder-bone, and because of its shallowness, is environed with a cartilaginous substance, and covered over with a broad and very strong ligament like a purse, which not only prevents the round head of the shoulder-bone from slipping out, but gives the shoulder an easy play, and adapts it to all its necessary motions. The great difference between the shoulder-bone of the human subject and that of the horse, is, that what is called the acromion in the former, and which is a process for being articulated with one end of the clavicle, or collar-bone, is wanted in the horse and most other animals, owing to their not having clavicles.

The scapula, or blade-bone, being principally engaged in the motions of a horse, much depends on its being properly situated. Thus, the more oblique it is with regard to the humerus, the greater power have its muscles of acting on this bone: its obliquity therefore constitutes both a beautiful and useful point. On the other hand, when it is placed almost perpendicularly, and inclines to the first dorsal vertebra, it is a bad point: in this case the horse is called thick-shouldered,

and is liable to fall. The shoulder-joint of the horse has a very considerable share of flexion and extension, but scarcely any rotatory motion; for which reason it is much stronger than in the human subject, and is very rarely dislocated.

THE HUMERUS.

The humerus, or shoulder-bone, is short in the horse and most quadrupeds, and extends from the joint of the shoulder backwards to the elbow, forming an angle. Its round head is articulated, as was before observed, with the inferior end of the scapula; while its lower extremity is also joined at the elbow to the upper ends of the bones of the fore-leg.

THE RADIUS AND ULNA.

The radius and ulna are the next two bones between the elbow and knee. The latter differs very materially from that of the human subject; reaching no farther down than half the body of the radius, to which it is connected superiorly by means of a strong ligament: but in adult horses it is ossified with the radius, and forms the posterior part of the elbow-joint. The projecting point of the ulna, called by anatomists the olecranon, and which forms the extremity of the elbow, is an important point in the anterior limb of a horse; for it is the lever on which several powerful mus-

cles are to act, and therefore can never project too horizontally backwards, or be too long: and on the contrary, when it inclines perpendicularly in the direction of the radius, the muscles have less power over it, which constitutes a bad point. This projecting bone of the elbow is sometimes fractured, when from the great degree of motion at this joint, and the impossibility of keeping the horse at rest, it generally proves fatal.

A punctured wound at the elbow, also, produces disagreeable consequences; for the external air, insinuating itself by the wound into the cellular membrane, spreads over the whole limb, and not unfrequently extends to the body of the animal *.

* In this case the horse should be kept at rest, to prevent the access of any more air: he also should be bled, to keep down inflammation: the part should be poulticed, and the following purge should be given once, and the diuretic occasionally. This treatment will shortly restore the animal to his former health.

PURGE.

Barbadoes aloes	. .	5 dr.
Castile soap	. . .	$\frac{1}{2}$ oz.
Oil of anniseeds	.	12 drops.

Syrup enough to form the ball for one dose.

DIURETIC.

Castile soap	. . .	2 oz.
Venice turpentine	.	1 oz.

Powdered anniseeds enough to give it consistence; to be divided into three balls.

The radius and ulna are articulated above, to the lower end of the humerus, forming the elbow-joint; and the lower extremity of the radius rests upon the small bones of the knee.

THE KNEE.

The knee of the horse corresponds with the wrist of the human subject, excepting that in the latter there are eight small bones, while in the former there are but seven; the trapezium being wanting in the horse.

The seven bones constituting the knee of a horse, bear the same names with those forming the human wrist; they are placed nearly in two rows, and are admirably calculated to give strength and considerable motion to this joint, at the same time that they serve to prevent concussion.

THE METACARPAL BONES.

The knee is immediately supported by three bones; the principal one, called the great metacarpal, or shank-bone, extends from that joint down to the great pastern, sustaining the whole superior weight: the two others are called the small metacarpal, or splent bones; they are placed one on each side of the great metacarpal bone, to which they are connected by ligaments, and re-

ceive a portion of the incumbent weight on their upper surfaces, and which are therefore articulated with the under part of the knee.

Now as these bones terminate in small rounded points before they come to within an inch of the extremity of the shank-bone, and that they have no support but their connexion by ligament with that bone; it follows, that whatever weight they share falls on the connecting ligament; which being of an elastic nature, admits of some degree of extension, and by that means helps to prevent concussion; and which appears to be the principal use of these two auxiliary bones.

SPLENTS.

But owing to too much weight being frequently placed on one of these bones, the connecting ligament, inadequate to support the burden, begins to be torn; and nature, to prevent dislocation, brings on inflammation, which produces ossific matter; and by it unites the small and great metacarpal bones together. So far, this process can scarcely be called a disease; the elasticity however of this part no longer exists: but it commonly happens that a mere union of the bones is not all; the ossific matter continues to be thrown out, till a considerable bony enlargement takes place, pro-

ducing pain and lameness. In this case the object should be to remove the extraneous bony matter by exciting its absorption, by the application to the part of the following blistering ointment; when, if a cure is not effected in a few days, it will be necessary to fire the splent, and to blister it again.

This diseased enlargement, termed *splent* from the bone concerned, takes place, in nine cases out of ten, on the inside of the leg, owing to the pernicious habit of turning up the outside heel of the shoe; and which, by throwing a more than ordinary degree of weight on the inside splent-bone, produces the consequences already described *.

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* BLISTERING OINTMENT †.

Spanish flies powdered	1 oz.
Oil of turpentine	1 oz.
Hog's-lard	4 oz.

Mix.

† In applying a blister, the hair of the part should be cut close, and the ointment well rubbed in; the horse's head should also be tied up, to prevent him biting or injuring the blistered surface; and the discharge, when it begins to exude, ought to be gently and frequently removed by means of a sponge and warm water, so as to preserve the skin from blemishes.

THE GREAT PASTERN AND SESAMOID BONES.

The *great pastern* is the next bone we have to describe; it is articulated at its upper end to the inferior extremity of the great shank-bone; where, with the two sesamoid bones (to be immediately described) it forms the fetlock-joint; and at its lower end it is supported by the small pastern. The two sesamoid bones are placed at the upper and posterior part of the great pastern, to which they are connected by strong ligaments: and as they are so situated as to increase the articulating surface of this joint, they necessarily receive a portion of the animal's weight in the different motions of the limb; when, being themselves supported by ligament merely, they consequently yield on pressure, and therefore prevent concussion. In this they resemble the splent-bones, already described; but the elasticity of the former is far greater.

Now when the bones below the fetlock are long, and slope forward, the weight is principally supported by the two sesamoids; and there is much elasticity, as is the case with blood-horses: but on the other hand, when the inferior bones are nearly straight and perpendicular, the weight

is supported chiefly by the great pastern, and the sesamoids receive very little; in which case there must be jar and concussion. These are points that concern the ease and pleasure of a rider.

THE SMALL PASTERN.

The *small pastern* receiving the inferior end of the great pastern-bone constitutes the pastern-joint, and which has a very limited motion, and is without any apparatus for preventing concussion, the super-incumbent weight being received a little below it, by the laminæ covering the coffin-bone; and which, as shall be explained, are peculiarly well adapted for effecting such a purpose.

The lower end of the small pastern (contrary to the shape of most other bones) is larger, and has a more extensive surface for articulation than the superior extremity: this appears to be designed, that it may the better articulate with the two bones beneath; viz. the navicular and coffin-bones, forming the coffin-joint, and which is also larger than the pastern-joint above it.

RING-BONES.

These are bony swellings which grow out from the small pastern-bones contiguous to the coronet;

and are frequently incurable, particularly if they have been allowed to cause an anchylosis, or stiff joint.

When treated in time, the following blister* may effect some service; and should this repeated not remove the disease, the actual cautery must be had recourse to.

THE NAVICULAR BONE.

This bone constitutes the posterior part of the coffin-joint, being connected to the pastern and coffin-bones by ligaments; and it performs the same function of preventing concussion in the movements of the limb, as the sesamoids and splent-bones.

THE COFFIN-BONE.

This is the lowest and last bone of either extremity, and may be considered the base of the rest of the bony fabric: it is contained within the

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* BLISTER.

Oil of turpentine	1 oz.
(to which add slowly)	
Vitriolic acid	$2\frac{1}{2}$ dr.
Hog's-lard	4 oz.
Spanish flies powdered	$1\frac{1}{2}$ oz.
Mix.	

hoof, which defends and supports it in a peculiar manner; but the description of which we shall defer till the bones composing the posterior limbs are explained.

OF THE POSTERIOR EXTREMITIES.

THE FEMUR, OR THIGH-BONE.

This bone reaches from the hip to the stiffle. Its upper head is round for being articulated in the acetabulum, or cup of the hip-bone; and as it turns backwards and forwards within this cavity, upon the alternate motions of the horse's leg, it is therefore called by some the whirl-bone. The lower end of this bone has two processes like a pulley, between which is a large space for receiving the protuberance of the leg-bone; and it also receives the patella or knee-pan.

THE PATELLA.

The *patella*, or *stiffle-bone*, as it is called in the horse, answers the same purpose as it does in the human subject; namely, a pulley for the great muscles moving the limb, and which are inserted into this bone. It is retained in its place by strong ligaments, and can neither be easily dislocated or fractured.

THE TIBIA.

The *tibia*, or *leg-bone* of a horse, is not very dissimilar to that of the human subject; and reaches from the stiffle to the hock.

THE FIBULA.

But the *fibula*, the accompanying bone of the tibia, is not like the bone of the same name in man. In the horse, it is merely attached to the external projection of the tibia, and does not extend more than half way down the length of this bone; so that its use is not at present well understood.

THE HOCK.

This part is composed of six small bones, and corresponds with the tarsus of the human subject; only that the latter contains seven bones. The one we shall principally observe is the os calcis, or heel-bone; it being intended to form a long and powerful lever for the muscles to act by, that are inserted into it, and which move the lower part of the limb. And as this bone is most materially engaged in the animal's progression, it

becomes a principal point, that it projects horizontally outwards, and to a considerable distance. Hence the horses of Arabia, and other blood-horses, having their hocks remarkably wide, excel all others in speed; while those, with what are called round hocks, are considerably slower in their progression.

THE METATARSALS.

The bones descending from the hock are called metatarsals; they resemble the metacarpal bones of the anterior extremity in every respect: they perform the same functions of sustaining weight, and preventing concussion; and they are also liable to a similar disease with the former bones: but with this variety, that what is called splent in the anterior limb, is termed spavin in the hinder one; and the ossific matter often in this disease extends to the hock-joint, creating greater lameness and difficulty of cure than in splents.

SPAVINS.

The spavin, then, being a deposition of bony matter, like the splent, its absorption also is the mode of cure. To effect this absorption, and consequent removal of the disease, it will be necessary, first, to fire the part; and afterwards apply

the following blister*. But should the bony deposition have extended to the hock-joint, the cure is then extremely doubtful.

The remaining bones of the posterior extremity correspond exactly with those of the fore-limb, and which we have already described. We shall now, therefore, proceed to the description of the foot of the horse; and which, from its peculiar construction and economy; and the numerous diseases to which, from ill treatment, it is liable, becomes one of the most interesting parts to be acquainted with about the animal.

OF THE FOOT.

The foot of the horse, comprising all that portion from the coffin-joint downwards, developes a curious and beautiful structure, and consists of many parts. For the sake of perspicuity, we shall divide it into the internal and external foot. The latter receives the former as in a case; is produced from it, and is intended to serve as a covering and protection between it and the ground: but first let us describe the internal foot.

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* BLISTER.

Spanish flies powdered	2 oz.
Vitriolic acid	2 dr.
Oil of origanum	½ oz.
Hog's-lard	4 oz.

Mix.

THE INTERNAL SENSIBLE FOOT.

The *internal foot* of the horse is composed of various parts, answering different purposes: first, it contains the navicular and coffin-bones (already described); and which serve not only to support the column of bones above them, but also to prevent concussion; and likewise to act as pulleys to the tendons of the muscles inserted into the foot. Next, of the portion of those tendons entering the foot for insertion: of a fatty substance behind the back tendons, filling up the space between it and the frog, and serving as a smooth elastic cushion to the tendons: of two thin cartilages growing out laterally from the coffin-bones; and which help to prevent concussion, and keep the heels of the foot expanded: of the sensible sole and frog, and whose vessels secrete the external horny sole and frog: and, finally, of a sensible laminated surface covering all the anterior and lateral parts of the sensible foot, and which being received into corresponding laminæ on the internal surface of the hoof, support the whole weight of the animal, as has been proved by removing the bottom of the hoof, when the crust was found sufficient to sustain him: these laminæ also possessing great elasticity, constitute a curious spring for preventing concussion when the horse is in motion.

Now the internal foot being that which secretes the horny substance, of which the external foot is composed, it is consequently supplied with numerous vessels, and also nerves; hence it is highly sensible of injury, and liable to inflame. And as it is closely embraced by the external horny foot, which is in contact with every part of its surface, any undue pressure on the external foot being propagated to the sensible internal one, an interruption to its functions takes place; and disease, with pain and lameness, follows. To render, however, this idea more clear, it will be necessary to consider the functions of, and parts composing, the external foot.

THE EXTERNAL, OR HORNY-HOOF.

The *external foot* of a horse being intended to enclose, and protect from the ground, and from injuries, the internal, vascular, and sensible foot, and which it receives within its cavity as in a case; is composed of a hard, elastic, but insensible, horny substance, extremely durable, and well-fitted for the purpose for which it is intended.

This external foot is called the coffin or hoof, and consists of the wall or crust, the sole, the frog, and the bars. The upper part of the crust,

where it is connected with the skin, is termed the coronet; the lower part in front, the toe; the sides of the crust are named the quarters; the quarters terminate in the heels; and the heels are connected with the frog. The crust, or wall, grows from the coronet, and takes an oblique direction in its descent; so as to acquire a conical figure, and be considerably wider at the basis than above.

THE LAMINÆ.

Nearly the whole of the internal surface of the crust is covered by a beautiful set of laminæ, very much resembling those of the under surface of a mushroom: they, as we have before observed, are received into similar laminæ situated on the internal foot, and by their union afford a powerful spring in the animal's movements, and also support his whole weight. This is effected by the following mechanism.

On separating the external from the internal foot of a horse, we find that the two surfaces, viz. the internal one of the horny hoof, and the now exterior surface of the sensible foot, and which were in close contact before separation, are both laminated; forming folds, not unlike, as we have

said, the under part of a mushroom. Now each fold of either surface is received between two others of the opposite surface, and being elastic and presenting an edge and two sides for contact, is admirably calculated for preventing concussion in the motions of the animal; and also sustaining his great weight without any injury of the part, by increasing the articulated surfaces, and consequently dividing the pressure. Thus, small as the two surfaces we are describing would appear, if not laminated; yet by the beautiful contrivance of throwing them into folds, their dimensions are wonderfully increased, and the weight falling on each foot is supported, not by merely a few inches of surface, but by one of some square feet. For the laminæ in a middle-sized horse being about five hundred on the inside of the hoof, and these being received in an indented form by five hundred more on the surface of the internal foot; and as each fold has two sides and an edge, the surfaces of union between the hoof and the foot will be three thousand, and which will be equal to a surface of about four square feet.

Now as this bond of union takes place in all the four feet, and collectively supports the greatest part of the weight of the animal; it is there-

fore evident that the hoof of the horse is intended to perform two functions, viz. to protect the internal sensible foot, and also to support his weight. And that it almost exclusively performs the last is proved, as was said, by wholly removing the horny sole, frog, and bars; when instead of the foot being forced to the ground, as must be the case if it had been supported by the removed parts; it continued to be sustained by the crust only, as before.

INFLAMMATION OF THE LAMINÆ.

The laminæ covering the internal foot, and which are full of vessels, and are sensible; are sometimes attacked with inflammation, attended with great pain and lameness. This disease arises most frequently from a contraction of the horny-hoof, but in some cases from internal inflammation, as of the lungs, &c., and also from too violent exercise, causing irritation in the sensible laminæ. It is most common in young horses, and the fore-feet are more liable to it than the hind-ones.

The cure consists in general and topical blood-letting: the blister recommended in page 47 (which see) for ring-bones, should be applied once or twice above the coronet, and the fol-

lowing purge* ought to be given; and, if necessary, repeated in a week. But where this treatment fails, the disease is apt to terminate in ossification of the laminæ; or in convex feet; and in some few instances the hoof has been detached from the internal foot altogether.

THE CRUST.

The crust, or wall, thus supporting the greatest share of the superincumbent weight of each limb, should be of a proper thickness and strength: and should also descend from the coronet, or upper part, in an obliquely perpendicular line to the toe. For if the wall be too upright and perpendicular, it generally follows, that it is also too thick and strong, which is productive of disease. And on the other hand, when the crust is thin and weak, being inadequate to support the burthen it has to sustain, it bends to it; and instead of describing a regularly oblique line in its descent,

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* PURGE.

Barbadoes aloes.... 7 dr.
Castile soap .... ½ oz.
Powdered ginger... 1 dr.
Syrup enough to form one ball.

During the time the horse purges, and for a day or two afterwards, he should be kept rather warmer than usual; and the water he is to drink made moderately warm.

it becomes too oblique, and even inclines horizontally as it approaches the toe.

In this case, the sole being pressed too forcibly downwards, loses its concave form, and in time becomes flat or convex; and which also lays the foundation for disease.

SAND CRACKS.

The crust of some horses is liable, in the dry season, to be affected with fissures, which generally run from the coronet downwards: they are to be found mostly at the sides of the crust approaching the heels. When they do not enter deep they produce scarcely any inconvenience to the animal; but on the contrary, if they descend to the sensible parts of the foot, they necessarily cause great pain and lameness, and require much attention to remove them.

As excessive dryness of the crust appears to be one of the causes producing sand-cracks, moisture is evidently necessary to prevent them, and also to assist the cure where they do exist; and with this view the crust so cracked should be kept constantly moist, either in the stable, or by turning the horse out into moist ground. But first it will be necessary to thin the quarter, and after opening the line of crack with a drawing-knife,

to apply a hot iron with the view of exciting inflammation, by which a matter will be discharged, which will tend to fill up the crack, and defend the internal parts; gradually, as the hoof grows downwards, the crack will disappear, and a cure be effected; but in the interim the edge of the crust below the crack should be so rasped as not to come in pressure with the shoe.

QUITTOR.

This is a disease of the foot which, from the injudicious way in which it is frequently treated, is the cause of destroying a large portion of the crust.

Quittor most commonly arises from an injury of the coronet, and runs in one or more sinuses downwards, and under the crust: it is attended with inflammation, pain, and lameness, and when not attended to in time, is apt to produce great mischief.

Instead of cutting away a large portion of the crust, as is often done; it will be barely necessary first to examine the direction of the sinuses, and afterwards to force into them some caustic medicine, as verdigris, which will generally operate a cure.

We will now proceed to examine the bottom

of the hoof, consisting of the sole, the frog, and the bars.

THE SOLE.

The sole, like the crust, is composed of a horny substance, which is secreted by the sensible, internal sole, just above it, and which this horny sole is intended to defend from the ground and external injuries. In its healthy condition, it is moderately concave on its exterior surface, and being somewhat flexible and elastic towards the heels, assists the action of the springs of the foot, by giving way in proportion to the descent of the laminæ.

CORNS.

The horny sole not being intended to receive pressure from below, should always admit a picker between it and the shoe; and when this precaution is neglected, and the shoe is allowed to lie in contact with it, the pressure created in the motions of the animal being propagated upwards to the sensible sole, interrupts its regular circulation, producing pain, inflammation, and lameness. This injury most commonly happens at the quarters, near the junction of the bars and crust; because here the sensible sole is placed between two hard bodies; the shoe below and a part of the navicular

bone above; and the disease is then termed a corn *.

THE FROG.

The frog is a very important part to be known; for from its good or bad treatment, arises more of the soundness or lameness of horses' feet, than from all the other parts of the foot besides.

Its shape is wedge-like, with a cleft behind: it is composed of a very tough, elastic kind of horn; and is intended to embrace the ground, serving thereby as a stop when the horse is in motion. But perhaps its principal use is to keep the heels of the foot expanded, and thereby prevent contraction, which almost always produces lameness sooner or later. The latter function the frog always performs, while it is in health, and that the heels of the shoe are not allowed to be so thick as to raise it above pressure with the ground: for, by continuing the pressure it receives from the

* To accomplish the cure of this disease, it will be requisite to have the shoe immediately removed, and the corn cut out with a drawing-knife. A sufficient space being thus made between the seat of corn and the shoe, the latter may be tacked on to protect the foot from injury; first having applied some tow, dipped in tar, to the diseased part.

ground to the parts above, these are necessarily expanded laterally, and contraction of the quarters consequently prevented. But, if it be cut away, as is frequently and erroneously done in shoeing; or if the heels of the shoe applied to the foot be made too thick, or turned up; in either case the frog being no longer in contact with the ground, there can be no pressure on the foot above; and the quarters of the crust, acted upon by heat, dryness, and perhaps ill-made shoes, necessarily contract; and the bottom of the foot, instead of being nearly a circle in shape, the heels being as far asunder as the toe is from the back of the frog; and which is the true and natural shape of a horse's foot before it is changed by disease and bad shoeing; becomes of partly an oval shape, the distance between the quarters appearing but short, in comparison to that from the toe to the back of the foot.

CONTRACTION.

Contraction will generally produce lameness; for the quarters of the horny hoof compressing the internal, sensible parts, injure and make them inflame; when pain and lameness are the consequence. This disease sometimes ends in ossifi-

cation of the lateral cartilages, by which their elasticity is destroyed; but it is most commonly attended with inflammation of the softer parts only of the internal foot, and which frequently produces that discharge at the cleft of the frog, called a thrush.

To prevent contraction, then, the frog should never be cut away in shoeing, nor the heels of the shoe be made so thick as to raise the frog above pressure with the ground. This precaution will not only keep the quarters of the foot expanded, and free from disease, but it will also preserve the frog in a sound state; for it is only when the frog is removed from pressure, and consequently prevented from performing its functions, that it becomes soft and diseased; and, to remove contraction, the object should be to bring the frog to the ground, so as to press upwards, and thereby expand the heels; but this should be done gradually by lowering the heels of the hoof, or thinning those of the shoe, till the frog is made to touch the ground; and, at the same time, rasping the quarters of the hoof, so as to thin the horn, and render its resistance to the expansion of the internal foot less. By persevering in this treatment for some time, and keeping the horny hoof moist, either by the application of water in the stable, or

turning the horse out to grass, many lamenesses, arising from contraction, may be cured.

THRUSH.

This, we have said, is a consequence of contraction, and consists in a discharge from the cleft of the frog, produced by the inflammation going on in the inside sensible foot. Now, as the discharge is the result of contraction, the means recommended for the removal of the cause, should here be used for the suppression of the consequence; with this exception, that, instead of turning the horse with a thrush out to grass, he should have his frog carefully preserved from moisture, which would aggravate the disease; and, to effect this purpose, and, at the same time, continue the hoof moist, he should be made to stand with his fore-feet in a tub, containing some water, the bottom of the tub being first covered with an inch or two of tar, so as to defend the frog from moisture.

By this treatment, the frog will be kept in constant pressure, and, at the same time, dry; while the quarters, being rendered more pliable by the water with which they are surrounded, will be more likely to expand; in which proportion, the cause of the disease diminishing, the cure will be advanced.

CANKER.

This disease may exist in any of the feet of a horse, but it is more generally found affecting the hind feet of that animal; and, from this circumstance, it is not improbable, that grease may greatly assist in its production; for the extremely offensive and penetrating discharge from the heels of a greased horse, constantly trickling down on the frog, and keeping it moist and soft, must, at length, render it unfit for performing its functions; when contraction, with its consequences, will take place, and both diseases united will terminate in canker.

But the fore-feet are also exposed to grease, contraction, and thrush, and why not be equally affected by canker? To this I answer, the fore-feet certainly are exposed to, and are actually often afflicted with the above diseases, but owing to their bearing more weight, and consequently having greater pressure than the hind-feet, the former offer greater resistance to the progress of disease, and consequently rarely run on to canker.

From the nature of thrush, it is evident it must tend to produce canker; for the discharge from the cleft of the frog destroying the hardness, and with it the functions of this organ, the contraction, or cause of disease, becomes aggravated, till the whole

of the frog is destroyed; when the destruction extends to the horny sole, and this is likewise rendered soft and rotten; and now the foot is in a state of canker.

This disease, when allowed to proceed too far, is generally incurable, the capability being destroyed with the sensible secreting sole, for producing a new horny sole, and the coffin-bone is now uncovered. To effect a cure, the diseased fungous parts must be cut away, till the blood freely flows; the foot should now be dressed with the following linament*, and the dressings be kept on by means of a bar shoe; nor should it be forgotten that pressure will be one of the best remedies for curing this disease. The dressings ought to be renewed once each day, so as to cut off any fresh fungous matter that may arise.

THE BARS.

The bars, or binders, are the two ridges, (one on each side of the frog), which extend from the heel of the crust towards the toe of the frog; they are a continuation of the crust, and afford a very

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* LINAMENT.

Oil of turpentine	$1\frac{1}{2}$ oz
Sulphuric acid	$\frac{1}{2}$ oz.
Mix slowly tar	3 oz.

Mix.

firm bearing for the heels of the shoe, at where they join the crust. The use of the bars appears to be principally to assist in keeping the heels expanded, by opposing their disposition to contract. Hence, they should not be cut away in shoeing, as is erroneously done.

Having now finished the description of the skeleton, with the foot of the horse, we shall say a few words on the proper mode of shoeing, before we pass to the muscles, the next subject for examination.

OF SHOEING.

A shoe is applied to prevent the injury and excessive wear of the hoof, and which, but for this protection, must take place, from the hardness of our roads, notwithstanding its toughness and continual growth. But, that it may answer the purpose of protection, without infringing on and destroying the functions of the foot, it is necessary that the shoe be made on proper principles, and also that it be properly applied. What should direct us in both, is the economy of the foot. First, then, the lower edge or base of the crust being, as we have seen, the part which sustains the animal's weight; and being also, from its proximity with the ground, the part most liable to injury and wear,

is the proper place for applying the shoe. To this edge, then, should the shoe be firmly fixed by nails, the heels of the shoe extending backwards, and resting on the junction of the crust and bars.

But as the shoe should no where be in contact with the horny sole, lest pressure against it may cause inflammation in the sensible sole above, care ought to be taken that a proper concavity be preserved on the surface of the horny sole. This is generally the case in a healthy foot; and may be mostly procured in other feet, by paring the sole with a drawing knife, prior to the application of the shoe. With this concavity, the shoe can be applied with a flat surface to the crust, instead of a concave one, which assists in causing contraction; and, by the sole having room to descend without resistance from the shoe, the elasticity of the foot is preserved, and the possibility of injury prevented.

Now, the frog being intended to act as a stop to the foot when brought to the ground, in movement, and being also designed to preserve, by its pressure upwards, the expansion of the heels; should never be cut away in shoeing, or raised above pressure with the ground, by making the heels of the shoe too thick. When either of these

happen, the frog being no longer capable of performing its functions, begins to decay, the heels gradually contract, and inflammation, pain, and lameness, generally follow.

And as the bars help to keep the heels expanded, they, in like manner, should be carefully preserved.

OF THE MUSCLES.

We now come to those instruments of motion called muscles, and without which the rest of the frame must remain motionless, being incapable of itself to perform a single movement. They are collections of fleshy fibres, forming bundles, which are connected together by a cellular membrane; and these bundles are again connected to others, till the whole muscle is produced. Each muscle is attached by its extremities to different bones; one of these extremities is called its origin; the other, its insertion. A muscle accomplishes motion by expanding its belly, or middle part, and contracting its ends towards the centre; when the parts to which those ends are attached, must necessarily be made to approximate: Thus, do we wish to bend the hand at the wrist, the muscles engaged in this action, by expanding their middle part, contract their extremities, and consequently shorten

their lengths ; and having one set of ends fixed in the bones above the joint of the wrist, and the other in the bones of the hand below it, the attached parts are pulled towards each other, and the flexure we desire is produced. In this manner are all the movements of the frame accomplished; and for this intent every animal, designed for motion, is supplied, more or less, with muscles, and which constitute its flesh.

The muscles differ greatly in size and shape, being fitted in both to the degree of force required of them, and the figure of the part they help to form. Thus some are long and round, as most of those that move the limbs; while the muscles of the trunk of the body are generally very broad and flat. Muscles often terminate in tendons for insertion ; these consist of a white, inelastic, insensible, and hard substance; and, as they require less room than muscles, they are well calculated to preserve the shape of the limbs and other parts; where, if they were replaced by muscles, the size must be unseemly great.

It should be observed here, that the muscles of one side of the frame have corresponding ones on the opposite side; and that they take their name generally in the horse, as in the human subject, either from the functions they perform, their figure

and shape, or from the parts where they are situated. We shall now proceed to take a rapid view of the different muscles accomplishing motion in the horse.

MUSCLES OF THE HEAD AND NECK.

There are a great number of motions peculiar to the parts belonging to the head and neck, which are therefore supplied with numerous muscles.

The eye-lids have three pair of muscles; one pair opens, and the other two pair shut them. The pair that opens is peculiar to the eye-lid only, while the two others are inserted into both, to bring them together, and to shut the eye; and all of them rise from the edge of the hole in the bottom of the orbit, through which the optic nerve passes to the eye.

The eye of the horse is moved in its different directions by six muscles, which take their rise from the bottom of the orbit, and are inserted into the sides of the eye-ball, as in the human subject: But there is in the horse a seventh muscle, called the retractor oculi; it arises from the bottom of the orbit, and is inserted all round the ball of the eye: it is very strong, and is intended to draw the globe of the eye into the orbit from injury, at the

same time that the haw is forced out, for the better defence of the eye.

The nose has four pair of muscles, for widening and contracting the nostrils; they arise from the upper jaw, and from under the eyes, and are inserted into the cartilages of the nostrils, and part of the upper lip. The action of these muscles is very perceptible in horses that are much heated by exercise, in broken-winded horses, and in cases of fever; when the nostrils open and contract in proportion as the animal is oppressed with disease.

The lips have five pair that are proper, and two common to the mouth and cheeks; some of which compose the fleshy part of the cheeks. The chief use of these muscles is to enable the horse to gather his food.

The upper jaw being of itself incapable of motion, therefore all the muscles that serve to open and shut the mouth belong properly to the lower jaw; the chief of which are the temporal muscles, which make up the fleshy part of the temples; and the muscles already mentioned as belonging to the chin and upper lip, and which have a considerable share in pulling down the jaw, so as to open the mouth; while the temporal muscles have the chief share in pulling it up, and shutting the mouth. There are other muscles for

moving the jaw several ways in chewing, and are therefore called the masseters; besides these, one pair thrust the jaw forwards, and another pull it backwards.

The tongue is itself a muscular substance, made up of fibres variously combined together, and in such a manner as may best suit and correspond with all its different movements. The tongue has five pair of muscles that are proper to it alone, and two pair that are common to it and the bone called os hyoides. Some of them arise from the lower jaw, and above-mentioned bone; and others that rise from this bone, have their insertions into the apertures of the lower jaw-bone. One pair, that pull the tongue backwards, arise from the temporal bones, and are inserted into the sides of the tongue; and another pair from the lower jaw, near the furthermost grinding teeth, and are inserted into the ligament or bridle of the tongue; by which means they are suited to all its various motions. The muscles common to the tongue and os hyoides, act chiefly in concert with the others, and give the tongue such motions as forward the aliment into the gullet, when it is sufficiently chewed and prepared to pass into the stomach.

The larynx, or head of the wind-pipe, has six pair of muscles for moving its different parts. The

epiglottis, which serves as a valve for opening and shutting the wind-pipe, has its muscles very small, excepting in animals that chew the cud. These muscles are all more or less liable to be affected with colds; which is the cause of that soreness of throat observable in some horses, and which hinders them from drinking and swallowing their food.

The pharynx, or head of the gullet, has also its muscles, which are often affected in colds: their office is chiefly to widen and contract the upper orifice of the gullet.

The muscles of the ears in horses are very distinct and perfect, and may be easily traced from their origins to their insertions; but in men they are small, because in the human ear there is but little capacity for motion; while brute creatures, being without hands, make use of their ears to drive away flies, and other offensive things. The motion of the ears is also necessary to brute creatures, for the reception of sounds, and to avoid dangers; and therefore we may always perceive somewhat of the intentions of a horse by the motion of his ears. When a horse sees any remarkable object before him, he pricks up his ears, and points them forward, with an intention to hear, especially when the object is attended with any noise; and when the noise or sound comes on one side, he turns his

ears that way, to take the sound; and when the noise is behind him, he lays his ears backwards; which is most observable in hot or fearful horses.

The ear is properly distinguished into the outward and inward ear. The outward ear has four muscles; the first lifts the ear up, and points it forwards; the second pulls the ear backwards; the third draws the ear forward, and points it downward; and these act together, and move both ears, when a horse looks steadfastly to any thing lying on the ground. The fourth assists the second, and pulls the ear backward and downward towards the neck. When a horse is wanting in a quick and sprightly motion of his ears, it is, in great measure, owing to the weakness of these muscles; for this defect is always more or less manifest in those that have their ears uncommonly large and thick, when perhaps the muscles are not sufficiently proportioned to the weight they are to move; and these horses are commonly the most dull and sluggish.

The internal ear has two muscles for moving the small bones it contains, and which are concerned in hearing; as shall be explained when we come to treat of that organ.

We shall now go on to the muscles of the head and neck; and which, in regard to the parts they have to move, are much stronger and larger than

those already described, and most of them have their origins placed at much greater distances from their insertions: the muscles, then, which perform all the motions of the head and neck, viz. forwards, backwards, sideways, and somewhat circular, are four pair, which are common to the head and neck, and eight pair proper to the head only. The proper muscles have some of their origins from the breast-bone, and also from the vertebræ, or rack-bones of the neck and chest; and are inserted, some into the occiput, or noll-bone, and others into the processes of the two temporal bones. Those of the neck, that act in concert with the muscles of the head, also take their origins from the breast-bone, the spines of the vertebræ of the chest, and rack-bones of the back; and are most of them, by proper gradations, some higher, and some lower, inserted into the transverse processes of the bones of the neck, and chiefly compose the bulk of flesh situated on those parts.

From this mechanism of the muscles of the head and neck, and particularly by their remote origins of the breast and rack-bones of the back, it appears how much they are suited to the several articulations of the joints, so as to secure them from harm in all their various turnings. Otherwise, in parts abounding with articulations, though they are well connected and tied together by strong liga-

ments, yet a horse might easily be injured by every quick motion, and by very slight accidents.

OF POLL-EVIL.

Before we dismiss the description of the muscles of the neck, it will be necessary to speak of a disease to which they are sometimes liable.

The poll-evil, so called from taking place in the poll, or upper part of the neck close to the head, arises from bruises, or blows on the part, and is, at first, simply an abscess confined to the cellular membrane between the muscles of the part; and may, in this stage, be easily cured by early and proper treatment, like other abscesses: but, on the other hand, if the disease be neglected, as is more commonly the case, till the matter finds its way to the ligaments and bones underneath, it then becomes much more difficult of cure, and requires a severer treatment.

In this case it will be necessary to lay open the different sinuses; and also, when there is opportunity, to make a depending opening for the matter to discharge itself by. The following corrosive and highly stimulating ointment * should then be poured into the cavity, while hot, with the view of de-

* OINTMENT.

Oil of turpentine	1 oz.
Verdegris	½ oz.
Ointment of yellow resin	3 oz.

Mix.

stroying the diseased surfaces of the sinuses, and also producing a healthy inflammation, and matter for filling up and healing the cavities. This mode of treatment, though severe, is yet the most likely, if judiciously proceeded in, to effect a cure of this very obstinate disease; and should it be found that applying it once has not been sufficient to destroy totally the diseased parts, it will be requisite to repeat it; after which the sore may be dressed, as a common abscess, with digestive ointment.

OF FISTULA IN THE WITHERS.

This disease being similar to poll-evil in its nature and treatment, deserves to be spoken of here.

At first this affection may also be treated like the former disorder, as a simple abscess; but should this be omitted, and the matter be allowed to form sinuses, these should likewise be laid open, and the mode of treatment adopted as recommended for poll-evil; viz. the ointment, prescribed in that disease, must be poured into the sinuses whilst hot, with a view of destroying their diseased action, when the sore may afterwards be dressed, as an ordinary abscess.

MUSCLES OF THE TRUNK OF THE BODY.

The muscles of the trunk, which include all those belonging to respiration, and other im-

portant purposes, may be divided into those of the breast and those of the abdomen; with the muscles of the back and loins, most of which are endowed with a great force.

But first it will be necessary to describe a muscle called the fleshy pannicle, and which is peculiar to quadrupeds; at least it is not found in the human subject.

This muscle may be said to belong to the skin, its action being wholly on this part: it serves, by throwing the skin into folds, or rugæ, to remove any offending matter, as insects, &c., that may lodge upon it: and, for this purpose, it is closely connected with the skin covering the ribs, shoulders, and hinder parts of the body of the animal. It has also attachments with the muscles lying beneath it, and which serve as so many fixed points during its motions.

The back and loins have four pair of muscles, common to both; the first are remarkable for their great length extending from the haunch-bones and os sacrum, and reaching to the two temporal bones: these being attached to the spines in their passage, are a great security to the back, and assist the other three pair in all its motions. When all the muscles of the back and loins act together, the whole back is extended; but when the muscles of

either side act solely, the body is inclined to that side only.

The abdomen has five pair of muscles, which arise from the ribs, haunch-bone, share-bone, breast and other contiguous parts, and are mostly inserted into the white line that divides the abdomen in the middle. One pair pass obliquely downwards; another pair obliquely upwards; a third have a straight direction from the breast to the share-bone; a fourth pair assist the straight muscles in pulling down the breast; the last are the transverse pair, which take their course from the loins and lowermost ribs on each side to the white line.

This partition, or white line, of the abdomen, is formed by the tendinous junctions of the muscles of both sides, and is particularly well adapted to so large and roundish a surface; for had these muscles not been determined in the middle, but been stretched over the whole abdomen, it would have been impossible for them to have acted with such force and energy. The use of the abdominal muscles, besides completing the cavity of the abdomen, and supporting the bowels, is to assist the muscles of the chest in respiration, and also in the expulsion of the feces.

The breast has four pair of muscles for widen-

ing and dilating the chest, and two pair that straighten and compress it. These make up that portion of flesh which covers the brisket and the breast from its upper part downwards to the pit of the stomach, expanding over most of the foremost ribs. Some of them have their derivations forwards, and from under the shoulder-blades, and rack-bones of the neck and chest, and some backwards from the spines of the rack-bones of the loins, and from the os sacrum; and are most of them so inserted into the ribs, as to render their action of elevating and depressing the chest easy and complete. The intercostals are the external and internal small muscles, which are situated between the ribs; and also assist in widening and straightening the chest alternately in respiration.

The diaphragm, midriff (or skirt, as some call it, in a horse or bullock), is a muscular substance which divides the cavity of the chest from that of the abdomen, and is a principal agent in the act of respiration; its fleshy fibres arise from the internal circumference of the chest, and converging like rays to a centre, are all inserted into a tendinous, flat substance at the middle. This muscle not only serves to divide the thorax from the abdomen, but also greatly contributes to the act of breathing. When its fibres contract, its convex

side, which is turned towards the chest, becomes gradually flat, and, by increasing the cavity of the breast, affords room for a complete dilatation of the lungs, by means of the air, which is then drawn into them by the act of inspiration. The fibres of the diaphragm then relax; and as it resumes its former state, the cavity of the chest becomes gradually diminished, and the air is driven out again from the lungs by a motion contrary to the former one, called expiration.

MUSCLES OF THE ANTERIOR EXTREMITY.

The shoulder-blade bones are carried through their different movements by four pair of muscles; they arise from the hind part of the head, from the transverse processes of the neck, and from the uppermost ribs, and are inserted into the blade-bones at different points. By these muscles the shoulder-blades are moved forwards, backwards, upwards, and downwards.

The shoulder; viz. that part which reaches from the point of the blade to the elbow, has nine muscles for performing its several motions: the first arises from the first rib, and, passing over part of the blade, is inserted into the shoulder-bone about its middle: this muscle helps to raise the

shoulder upwards. The second rises from the spine or ridge of the shoulder-blade, and is inserted into the neck of the shoulder-bone: this also helps to raise the shoulder upwards. The two depressors pull the shoulder downwards. The first has its origin from the os sacrum; from the haunch-bone; and rack-bones of the back, and, with its fellow on the other side, spreads over a great part of the back, from whence it is called latissimus dorsi, or the broadest muscle of the back. The other rises from the lower side of the shoulder-blade, and is inserted into the upper and inner side of the shoulder-bone. The two pair that bring the shoulder forward, are the pectoral muscles, and another which rises from the interior part of the blade bone, near its brim, and is inserted into the middle of the shoulder-bone. The pectoral muscles are so called, because they cover most of the breast, and are inserted into each shoulder-bone, a little below their round heads. The remaining three muscles move the shoulder backwards: the first has its origin from under the spine of the blade-bone, and is inserted into one of the ligaments of the shoulder-bone; the second is placed between the shoulder-blade and ribs, and is inserted into another ligament of the shoulder-bone.

The motions of the shoulders of horses and most quadrupeds are more limited than in men, their chief action being forwards and backwards, wherein they have a capacity of being raised higher or lower, according to their several requirements.

The fore-arm, extending from the elbow to the knee, is carried through its motions by powerful muscles, arising from the blade-bone; some of these muscles are inserted, by tendinous ends, into the olecranon, or point of the elbow, and extend the fore-arm, while the arm itself is bent. Others are inserted into the bones of the fore-arm for bending this part of the limb.

The shank, which reaches from the knee to the pastern, has two muscles that bend the knee, and two for extending it. The flexors arise from the inner and upper part of the shoulder-bone, and, passing beyond the knee on the inside, are inserted into the hinder part of the top of the shank. The extensors derive their origins from the external and superior part of the shoulder-bone also; and their tendons, passing over the knee, are inserted into the fore part of the head of the shank; and, together with the ligaments of this part, help to secure and strengthen the knee-joint.

The fore-pastern and foot have also their flexor and extensor muscles; and which, from their ar-

rangement and liability to injury, deserve particular notice. The extensor arises from the external and inferior end of the humerus, and also from the outward and lower extremity of the radius; and descending fleshy to within about two inches of the knee, it here becomes tendinous. From this point its tendon descends along the knee, under an annular ligament, and, continuing its course down the anterior surface of the cannon-bone, it passes over the fetlock, where it is also bound down by another annular ligament: still descending, it receives, about the middle of the large pastern, two slips of ligament, from what is called the suspensory ligament, (which shall be hereafter explained); and now the tendon of the extensor muscle expanding, is inserted partly into the anterior and lower end of the large pastern; in part, into the anterior surface of the small pastern; and, lastly, into the superior and anterior process of the coffin-bone. The use of this muscle being simply to extend the lower part of the limb, but principally the foot, and carry the leg forward after it has been raised from the ground by the flexors; it is neither so strong as these, nor so liable to injury.

The flexor muscles, from having to support a part of the animal's weight, are necessarily very strong and powerful; their tendons constitute what

are vulgarly called the "back-sinews;" and from the eculiar arrangement of t ese tendons, the muscles are themselves distinguished into the "perforating" and the "perforated."

The first arises by three distinct heads; viz. two from the lower end of the shoulder-bone, and one from the ulna; and desce ding fleshy, till approaching the knee, each portion here becomes tendinous; when the whole uniting, form one strong broad tendon, which passes at the back of the knee, under a ligament, the inside of which secretes an oily liquid for keeping the surface of the tendon moist, and thereby preventing friction with the neighbouring parts. The tendon now descends along the posterior side of the cannon-bone, till having arrived within about two inches of the fetlock-joint, when it perforates the tendon of the other flexor-muscle, and runs within it as in a sheath, until both reach as low down as the lower end of the large pastern. The perforating tendon now passes over the navicular bone, and is inserted into the inferior and posterior concavity of the coffin-bone.

The second, or perforated flexor, arises from the posterior and inferior end of the humerus, and becoming tendinous as it approaches the knee, continues its course downwards to where it divides to

form a sheath for the other tendon. After this it still descends, passing behind the pastern, and is inserted partly into the heels of the frog, but principally into the inferior end of the large pastern, where it forms lateral ligaments to the pastern joint.

The suspensory ligament (of which we spoke before) arises from the superior head of the large metacarpal bone, and dividing, about two inches above the sesamoid bones, into two branches, both are inserted into these bones, and are of great use in preserving them in their right situation during the violent motions of these parts.

STRAINS.

Both the muscles, ligaments, and tendons of the horse are liable to strains, which often produce lameness. Strains of the muscles are generally attended with considerable lameness, and are soonest cured. In strains of the ligaments, some parts of them are often ruptured, and it is therefore a long time before a cure is effected. But the strains of tendons are most frequent in the horse, and often produce very disagreeable consequences.

STRAIN OF THE SHOULDER.

This is more properly an inflammation of some of the muscles of the shoulder, occasioned by

great and sudden exertion, or by blows or falls: the lameness comes on suddenly, and the horse drags his toe along the ground, as if incapable, or prevented by the violence of the pain in his shoulder, from extending the limb at that side.

Inflammation of the foot is often mistaken for this disease, but can always be distinguished from it by attending to the difference of their respective symptoms. In inflammation of the foot, the part feels hot, and most commonly appears contracted, or shews some marks of injury, and the lameness comes on gradually; whereas, in strain of the shoulder, the lameness comes on, as we have said, suddenly, and the toe of the injured side is dragged along, as if the limb had been paralyzed.

The cure consists in bleeding in the shoulder or plate vein, with a view of relieving the part from inflammation: put a rowel in the chest, to assist this object, and give the following laxative ball* three or four times, observing an interval of a few days between the exhibition of each. Rest, and a run at grass, or the freedom of a loose stall, will also forward the cure.

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* LAXATIVE BALL.

Aloes (Barbadoes)	3 dr.
Castile soap	$2\frac{1}{2}$ dr.

Syrup to form one ball.

STRAIN OF THE STIFLE.

This affection will be easily discovered by the heat and tenderness of the part; it is always produced from blows or other injuries.

The cure consists in fomentations to the part; a rowel also may be placed with advantage in the thigh, to help to lessen the violence of the inflammation; and if the horse be in full condition, it will be serviceable to bleed moderately, or give a purge.

When the inflammation has subsided, and the joint still continues tender, camphorated spirits of wine should be applied daily, with gentle exercise, till a cure is effected.

STRAIN OF THE HIP-JOINT (OR WHIRL-BONE).

This disease rarely occurs, on account of the many, great, and powerful muscles, which defend the hip-joint; and yet it is generally pronounced to exist, by uninformed persons, when the cause of lameness is really in either the hock-joint, or parts further down the limb.

When, however, it is situated in the hip-joint, it should be treated as is recommended for other strains of muscular and ligamenteous parts; viz. fo-

mentations should be applied to the affected part: the horse should be moderately bled or purged, when rest, and the application of some stimulant, as camphorated spirits of wine, or even a blister, will generally complete a cure.

STRAIN OF THE FLEXOR TENDONS.

In the tendons of the legs, and which we lately described, a strain may be caused either by a sudden and violent exertion of the animal, or by cutting away too large a portion of the heels of the hoof in shoeing; or by too suddenly putting on shoes unusually thin at the heels; in both of which cases the animal's weight being thrown in too great proportion on the tendons of the leg, causes an inflammation, swelling, and soreness, in the membranes covering these tendons; and, in some cases, perhaps the inflammation may extend to the ligaments, and even the tendon itself, producing great pain and lameness. The cause of the injury being discovered; and if it consisted in too suddenly lowering the heels, being instantly removed, the horse should be kept in a state of rest, and warm poultices applied to the inflamed part: bleeding and a cooling diet may also be necessary. After severe strains, it will not be ad-

advisable to work the animal for a considerable time, as the parts are liable to be easily affected again: should a swelling and hardness continue after the inflammation has been suppressed, the blister recommended for splents in page 44 may be applied; and should this fail, a run at grass will be found generally efficacious.

Owing to an unfounded opinion which some persons have entertained, that in this disease the tendons themselves are actually strained and stretched beyond their usual length, several medicines have been applied with the erroneous view of again bracing them up to their proper extent: but as it is contrary to the nature of a tendon to be possessed of this stretching power; and that it is so, is proved by the rupture of the tendon of the heel in the human subject so frequently taking place; and which disagreeable accident could not, at least so often, happen, had the tendon been provided with a stretching power: it follows, that all medicines applied with the above intent are absolutely useless.

MUSCLES OF THE POSTERIOR EXTREMITY.

These are not only more numerous about the hips and loins than the muscles are about the

shoulders, but they are also possessed of greater force; and this will be found necessary when it is considered that the muscles of the hinder limbs are not merely intended to support a share of the animal's weight, but also to effect progression. For this purpose, then, the posterior part of the horse's skeleton is filled up so as to appear full and plump, with large, strong, and powerful muscles: those moving the thigh arise, some from the posterior part of the spine, and others from the pelvis; and they are inserted into the thigh-bone for performing its different motions. Some of these muscles constitute the fleshy part of the hip; whilst others of them pass over the whirl-bone, and are an additional security to the hip-joint.

The leg, comprehending that part which is usually termed the thigh, in a horse reaches from the stifle, or knee-pan, to the hock. It is carried through its several motions by powerful muscles, some of which take their origin from the bones of the pelvis, and others from the thigh-bone; and running downwards, are inserted partly into the patella, or knee-pan, and in part into the tibia, or leg-bone. These muscles extend, bend, and move the leg a little obliquely; and they, together with the muscles remaining to

be described, compose the fleshy portion of the hinder limbs.

The instep, including that part which reaches from the hock to the pastern-joint, and commonly termed the small of the leg, has its motions performed by means of a few powerful muscles. It is bent, or brought forward, by two muscles chiefly, which arise from the superior part of the leg-bone, and descending along its anterior surface, are inserted into the fore-part of the cannon-bone, a little below the bend of the hock. But the muscle extending this part, being that which is principally concerned in effecting the progression of the animal, deserves a more particular description.

This muscle corresponds with that called gastrocnemius in the human subject, and which forms the calf of the leg: in the horse it is a single muscle, but arises by two heads from the posterior part of the thigh-bone. These heads descending thick and fleshy, soon unite, and form a very strong and powerful tendon (called the tendon of Achilles) as in man; this tendon continuing its course downwards, is inserted into the point of the hock, which, by its projection, enables the muscle to exert a greater force in sending the animal forward.

The remaining muscles of the posterior limb, and which move the pastern and foot, being nearly similar in arrangement and action with the corresponding ones of the fore-extremity, we shall refer to the description of these for a knowledge of the former ones.

Having now finished a rapid sketch of the muscles moving the frame of the horse, it will be necessary to say a few words on that astonishing power which enables these organs to accomplish their operative functions with such force and celerity as we see they do.

OF MUSCULAR MOTION.

Numerous and complicated as are the motions of a horse, they are all, nevertheless, reducible into two kinds; viz. the voluntary and the involuntary: there are others called mixed; but as these are at times under the command of the will, they scarcely deserve a distinct place. Both kinds of action are accomplished by the contraction of the muscular fibre, which constitutes the fleshy portion of every animal body, and is the great immediate agent of motion throughout them all. This contraction again of the muscular or fleshy fibre, is induced by the presence of some stimulus, which, acting on the irritable quality of the

fibre, forces it to contract; and here we arrive at the immediate cause of the animal's motions.

Contractility then, is that power in muscular bodies, by which all their actions are directly executed. These actions are called voluntary when effected by the contractility, at the instigation of the will: involuntary, when accomplished by the same contractile power, but at the instance of some stimulus different from that of the will, and wholly independent of it. Thus the blood, acting as a stimulus to the heart and arteries, causes these organs to contract, by which the circulation is sustained independent of the mind. So also is it with the stomach, intestines, and indeed all other involuntary motionary organs; they are forced to contract by the presence of a stimulus different from that of volition, and consequently perform their functions likewise independent of the mind. But the case is different with the voluntary actions: here a single movement cannot take place but by the command of the will. Thus, for instance, do we wish a horse to walk, trot, or gallop; or that from any of these paces he should instantly discontinue and remain at rest; before the act we desire can be accomplished, it must first be known and determined upon in the mind of the animal. This subject,

however, shall be more fully explained when we come to speak of the brain and nerves.

Whether this contractile power of muscles, by which the motions of animals are executed, be derived from the nerves, or is a property wholly distinct from them, is a dispute amongst physiologists that remains yet to be determined. All that is certainly known is, as we have seen, that whilst some muscles perform their functions wholly independent of the mind, and are therefore termed involuntary; there are others called, in contradistinction, voluntary muscles; because they are unable to accomplish the smallest voluntary motion without the interference of the nervous influence. We will therefore close a subject still wrapt in uncertainty, with an observation on the close dependence of muscular motion on the atmospheric air.

That certain properties absorbed by the blood, from the air taken into the lungs in breathing, are absolutely essential to the continuance of those movements called involuntary, and which directly support life, is demonstrated by numerous experiments. Thus, for instance, if an animal be confined to a certain quantity of air, it will continue without feeling change, while it has a sufficiency of that fluid to respire; but the vital portion of

the air being at length consumed, and no fresh supply admitted, the creature now begins to gasp for want of it; his circulation becomes languid, convulsions follow, and all the vital movements gradually ceasing, death, to all appearances, shortly follows. And in fact, if no means of recovery be used, the creature absolutely must die: but if, on the other hand, the apparently lifeless body be removed from the foul air in which it expired, and some fresh healthy air be forced at proper intervals into its lungs, the heart will, most probably, after a short time, be stimulated into its usual contractions, the circulation will be again restored, and with it the life of the animal. Thus we see, that a constant supply of fresh atmospheric air is absolutely essential to life; and that, where it is denied, the muscular power must soon cease: and hence may be inferred the necessity of preserving to horses in stable a sufficiency of pure unrespired air; for if its total absence suspends, in a few minutes, life altogether, surely the partial corruption and diminution of this fluid, must, in proportion, impair their strength, and expose them to disease.

Again, we observe the great dependence of muscular motion on the atmospheric air, in the increased quantity of this fluid, which a horse,

and indeed many other creatures, respire when under violent exertion. This may be best seen in the changes which a race-horse exhibits when running. Prior to his commencing the race his breathing is but little increased, and he respires not much more air than usual; as his exertions increase his nostrils expand; he breathes quicker, and his blood is made to circulate much faster than before, owing to the additional stimulus it has received from the air in the lungs. He is now pushed by the rider, and his own generous and noble spirit urges him to surpass some rival racer: they rapidly approach the winning-post—both animals exert themselves to the utmost, and at this moment all the appearances already described are at the height. The race being ended, and the horses allowed to walk gently, the increased breathing and circulation still continue, but not so violent as before; by degrees both subside to their ordinary degree of action, and the animal soon recovers the quiet condition he enjoyed prior to the race.

Now racing being a rapid movement of the animal, wholly performed by the voluntary muscles; and these muscles depending, as we see they do, on the nervous energy to enable them to act; their increased motions, and which are ne-

cessary to effect racing, require consequently a proportionately additional quantity of this energy from the nerves: and hence may be explained in part the motive for the blood's increased velocity under all violent exertion. For this fluid flowing, during the period of exertion, in greater abundance to the brain, enables this organ to extract from it a larger and more suitable supply of the nervous energy, and without which the increased action of the muscles could be no longer sustained: but as the blood is itself but a medium for containing the properties which the brain separates for the purpose of motion; and that these properties are, in all probability, derived from the atmospheric air in breathing; so we find, that this function also is accelerated, by which a larger supply of the above properties is afforded to the blood.

OF THE

BRAIN AND NERVES.

THESE admirable organs enabling the voluntary muscles to perform all their actions, and endowing the animal with feeling, follow next in description. We shall first point out generally their figure, situation, and known properties; and afterwards take notice of the diseases to which they are liable, with the best modes of cure.

The brain occupies that cavity formed by the bones of the skull at the superior part of the head, and in the horse is not one-fourth part as large as in man. It is covered with two membranes, which, by lining the inside surface of the skull, prevent its inequalities from injuring that delicate organ. The first membrane is called dura mater, as in the human subject; it is of a strong tendinous nature, and also serves to prevent concussions of the brain, by supporting its different divisions with the folds, which this membrane sends in between the separated portions of that organ.

The second membrane of the brain is different from the first, in being extremely soft and sensible: it lies next to the surface of the brain, dips into all its furrows and convolutions; and as this membrane is the medium through which the blood-vessels pass to the brain, for supplying its waste, and recruiting the stock of mental energy; so it sometimes becomes the seat of disease. There is a very thin and delicate membrane lying between the two already described, but it does not enter the fissures of the brain, like the pia mater, or second membrane of that organ.

The brain of the horse, like that of most other animals, is partly of a roundish figure: it is of a soft pulpy consistence; and in colour, is white internally, but grayish on the outside. As so soft a mass may be liable to concussion and injury from the violent blows and motions to which the head is frequently liable, the all-wise Creator has divided its substance for a considerable way from the surface in several places, and supported the divided parts by introducing folds of the dura mater between them, so as to sustain each portion of the brain in its proper place, and prevent it striking against, or being struck by, the adjacent portion of that organ.

In consequence of this partial division of the

substance of the brain, it is commonly described as consisting of three great portions, though in reality the separations cease long before we reach the centre of its base. The first great division, called cerebrum, is placed superiorly in man, but inferiorly in the horse, owing to the horizontal position of the latter; and to the same cause is to be attributed the elevation of the second portion of the brain, termed cerebellum, above the first, or former division, in this animal. The third portion of the brain of the horse also corresponds in name with that of the human subject; but in the former creature it occupies the posterior part of the skull, while in man it is situated inferiorly: it is a continuation, or union, of the white, or medullary substance of the other two portions of the brain; and is partly on that account, and in part from its figure, called the medulla oblongata.

From this third portion arises what is generally termed the spinal marrow, but which in reality is a continuation of the brain; its substance being, like this, partly of a white, and in part of a grayish colour, and it being covered and defended by similar membranes to those protecting that organ. This continuation of the brain passes out of the head by the great opening in the occipital,

or hinder bone of the skull, and running along the canal formed by the bones of the spine, or back-bone, and in which it is safely lodged, gives off several nerves to the body and limbs, as shall be immediately seen.

The nerves are white roundish cords, which arise either from the brain, or spinal marrow, and passing off in pairs, are distributed to mostly all the parts of the body. Their texture, like that of the brain, is unknown; but they are denser in consistence than the former. Some suppose nerves to be transparent, from the bottom of the horse's eye being discernible through that part of the optic nerve called the retina: but notwithstanding this circumstance of the retina's transparency, both in the horse, dog, cat, and several other animals, yet that all the other nerves of the frame are transparent is still unproved. The course of the nerves is in company with the arteries and veins, and, like these, they communicate, or their branches run into each other, and form what is termed a plexus: by this beneficent contrivance sensation is carried on, notwithstanding some principal branches should be obstructed or destroyed, and which could not be the case but for the above provident communication: and that an accident or injury of this sort may be of the

least possible evil to the creature, and the soundness of the parts be again restored, the all-wise Creator has endowed the nerves, like other parts of the frame, with the power of regeneration. This is proved by dividing either branch of the eighth pair of nerves, called the par vagum, when it will be found that a coagulable lymph will be thrown forth, which, after changing into a substance possessing all the qualities of nerves, will re-unite the divided parts, and effect their regeneration as before. In this experiment also, it will be seen, that while one branch of the nerve is totally divided, the other branch, by its communication, carries on sensation in the parts to which the divided branch is distributed, and which, but for this communication, must be rendered wholly senseless by the division of the nerve. For if both branches of the same nerve, the par vagum, be divided, the communication, with the brain is now entirely cut off; and if this happen to a horse, he immediately dies, but a dog will survive some time after it.

Nine pair of nerves are counted as arising from the brain within the skull; a tenth pair, as the spinal marrow, passes out of the great opening of the head; and the remaining thirty-seven pair from the spinal marrow, after it

has descended into the canal formed for its lodgment. Of these, the first pair are called the olfactory, because, passing through the ethmoid bone, they are spread in innumerable small branches all over the membrane, lining the inside of the nose, for the purpose of effecting the sense of smelling.

The second pair are called the optic nerves: they pass through the sphenoidal bone of the scull, and entering each orbit of the eye, form, at its back part, that nervous expansion called retina.

The remaining seven pair are distributed chiefly, and almost exclusively, to the different parts of the head and neck, except the eighth pair, called on this account par vagum, and which has branches running to almost all parts of the body.

The tenth pair, arising from the spinal marrow just as this substance leaves the brain, goes principally to be distributed on the exterior of the head.

The spinal nerves, if they may be so called, as arising from the continuation of the brain, contained within the canal of the spine, are, as we have said, thirty-seven pair in number. They pass out from the spinal marrow between the interstices of the vertebræ, and are distributed partly to the internal organs of the body, in part to the muscles

covering the frame, and lastly to the limbs, in which they may be seen descending in very principal branches.

What is the nature of the brain and nerves, or how these organs accomplish the astonishing results which we see produced by them, is still a mystery, and therefore not, agreeable to the plan of the present work, to be discussed here; we shall, in consequence, pass on to an examination of their known properties.

The brain and nerves of a horse, like those of all other creatures, are what endow all the other parts of the animal with feeling or sensation: this is proved by tying or otherwise obstructing a nerve going to any part, so as to cut off the communication between this part and the brain, when a loss of feeling instantly takes place below the point of obstruction; but this being removed, the parts recover their feeling as before.

They are also the cause of all voluntary motion; as may be seen by the loss of this motion taking place from the compression of the brain, either from an extravasation of blood or water, or from some other mechanical cause, when the whole body will become paralyzed, and the power of motion suspended: but on removing the compressing cause, this paralysis will vanish, and the

animal be restored to its capability of voluntary motion as usual. If the spinal marrow be compressed, the same loss of feeling and motion will also take place, but only in the limbs and such parts of the body as receive their nerves from it; and the same return of both these powers will follow the removal of the compression; and the obstruction of a nerve will, in like manner, cause a loss of motion in the muscles to which it is distributed, but which will also be removed with the obstructing cause.

How or through what medium the brain and nerves cause the voluntary motions, is as unknown as is the mode in which these organs effect sensation and perception. We know that the will having determined on an act, sends its commands along the nerves from the brain to the muscles to be engaged; these, irritated by the influx of the nervous energy, instantly contract (the mode in which all muscles effect motion), when the act we desire is thus produced. This is the case in man, and also with the horse: various, complicated, and innumerable as are the motions performed by this animal, independent of those termed involuntary, and which are for the most part vital movements, carried on in the internal parts of the frame; yet are all the former ones the consequence

of determinations of the will, nor can a single one of them be effected without this determination of the will being first made. This appears evident from the obedience of a horse in performing such movements as we desire; and it is also illustrated in the resistance sometimes made by that animal to the accomplishing of our wishes: for both the execution of the act and its refusal are the result of that prior operation in the mind, which we term willing.

Now, where there is a will, there must be perception, otherwise the former faculty could have no objects for its operation, and would therefore be useless. This perception, for sake of clearness, we shall call the sense of the brain, as what we term sensation may be said to be that of the nerves: these possess the power of being impressed by various substances in nature, and of sending their impressions onwards to the brain, which organ having also the power of being further affected by these impressions, perception or consciousness of the impressing object takes place in the mind. This may be ranked as the basis of all the other operations of the mind in all creatures, and is the medium through which they receive all the knowledge they possess of the things in creation.

This perception again is divisible in the horse

as in man, into direct perception, or such as is caused at the instant by the propagation to the brain of the impressions received by the external organs of sense; thus the eye being impressed with the figure or colour of any object, communicates the impression by the optic nerve onwards to the brain, where the perception or idea of the impressing figure or colour is immediately formed: and into perception by reflection, which is also the delineation in the mind of impressions, but such only as had been some time before conveyed to the brain from the organs of external sense, and consequently are now merely reproduced by that act of the mind called memory, or such as are created within the brain itself by the operation of the mind, we call thinking. And that the mind of a horse is capable both of recollection and thought, to a certain degree, is proved; the first, by a variety of familiar circumstances known to every one conversant with a horse, and therefore not requiring to be particularized; and the second, by the appropriate, for instance, increased exertions made by this animal in leaping and clearing a fence, wall, gate, &c.; and which unusual exertions must have been perceived and determined upon as necessary in the horse's mind, prior to his arriving at the place to be thus cleared.

But merely seeing and knowing things through the medium of sensation and perception, would not be sufficient to draw the animal from a state of inactivity; to effect this, the Supreme Architect has used the same means, but in a more humble degree, as in man; namely, he has interwoven pleasure and pain with the frame of the horse, and so contrived both, that they have the power not only of leading him into action, but also of directing him to the choice of fit actions afterwards. This capability of pleasure and pain is evinced in so many actions of the horse, as not to require any instance in proof.

We have sketched the great outlines of the horse's mental constitution, with a view to point out, in a succeeding article, the treatment he is, in right of his nature, entitled to; and the reverse of which is cruelty and a breach of the law of natural justice. We shall now proceed to describe the diseases to which the brain and nerves are liable, and also their mode of cure.

THE STAGGERS.

The *staggers* is a disease of the brain, arising from an unusual determination of blood to the vessels of this organ, by which its operations become greatly disturbed. It is mostly produced

from full feeding, and too little exercise: but it may also take place from an accumulation of water in the ventricles of the brain. Its symptoms are at first drowsiness, the horse being much disposed to sleep, dulness and heaviness of the eyes, loss of appetite, and costiveness, with full and slow pulse. The disease is now termed the sleeping staggers; but if the proper treatment for its removal be omitted at this stage, an inflammation of the brain ensues, the horse becomes delirious, he plunges violently, falls down as if exhausted, and again starts up with wildness; and now the disease is distinguished by the term mad-staggers, and generally terminates in death. It should here, however, be observed, that the latter disease is not always preceded by the former, it being sometimes the primary one affecting the animal.

As the staggers is in general the effect of a plethora, or too great a fullness of blood in the system, bleeding largely is necessarily the most efficacious remedy. When this is done early in the disease, a cure is often effected; but if the symptoms should not abate in ten or twelve hours, the operation should be again had recourse to. The following purgative draught should also be given, and, with a view to divert the blood from

the head, a rowel may be placed under the jaw. This treatment will, most commonly, be effectual; but should it otherwise happen, and that the delirious or mad-staggers succeed, opening the temporal arteries, and allowing them to bleed copiously, and also blistering the head, are the most likely means to produce benefit.*

LOCKED-JAW.

Locked-jaw is a disease which sometimes takes place in horses, and the only one to which their nerves seem liable. It consists in too great an action of the nervous system, as may be seen when this disease affects the human subject; for when the patient is asleep, the nerves are then at rest, all the muscles are relaxed, and the mouth, which was before shut close, is now open; but on the patient's awaking, the nerves resume their increased action, the muscles are contracted as before, and the mouth is again closed.

This disease seems closely connected with the

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* PURGATIVE DRAUGHT.

Barbadoes Aloes............7 dr.
Castile Soap...............2 dr.
Water.....................1 pint.
Mix for one Draught.

sympathizing power of one part of the frame with the other: thus we find, that if the foot of a horse be pricked by a nail, his whole body will sympathize, or be affected in such a manner as that the animal will be off his food, his coat will stare, and sometimes locked-jaw will follow: and hence perhaps it is, that comparatively slight injuries, such as wounds of the feet, and even the operation of docking, will sometimes give rise to this fatal disease.

Locked-jaw being then an excessive action of the nerves, causing consequent contraction of the muscles, the whole frame necessarily becomes rigid, the animal appears as if fixed to the place on which he stands, his jaws are fast-locked together, so as neither to admit food or medicines, and he shortly dies from the excess of irritation. Several remedies have been tried to arrest the progress of this formidable disease, but hitherto in vain: some advise the use of strong stimulants, such as ether, opium, hartshorn, and brandy, to be given internally, while others suppose that immersion in cold water affords most relief.

OF THE TREATMENT DUE TO *THE HORSE.*

SEEING in the last article that the horse is a being possessed of feeling and perception; that, by the first of these properties, he is capable of being impressed by various objects around him; and that by the latter, ideas of these objects take place for the information of his mind; and having then also seen that all his actions, excepting the mere vital movements of the frame, are under the absolute dominion of his will, and that this will is determined by the laws of what we call pleasure and pain; it is from this beneficent system of government, and which we see extended by the Creator to all animated nature for its guidance and happiness, that rules should be deduced for the just treatment of the creature, which we think proper to hold under our subjection, either for our amusement or use.

At present, it is true, the horse is treated partly agreeable to the above principles; but owing to the ignorance of the persons who generally have the management of horses, a sufficient estimation is not made of their mental capacity; the proper means, therefore, are disregarded or neglected for conveying to the animal's mind a knowledge of our wishes, and the poor creature is often cruelly abused for not performing some act, of which he had no prior notice. This treatment, besides its cruelty and injustice, is calculated to break the spirit of some horses, and render others, of a stronger nerve, obstinate and fractious; and to remedy the evil, and render justice to the animal, it is necessary that fit methods be always used for informing the horse's mind of the act we wish him to perform, prior to our inflicting punishment for disobedience: in this we shall have only copied the wisdom of nature, which certainly does not punish a creature for not having accomplished an act of which it had received no prior idea or intimation.

The Supreme Governor of all things rules his creatures by their love of happiness, and hatred of misery; these principles are universal in animal nature, and belong, as we have seen, to the horse, but in an inferior degree, as well as to man. And

it should be never forgotten, that, in this paternal constitution of government, by pleasure and pain, the latter is made to attach only to such conditions, actions, and things, as are really injurious in themselves, and would tend, by their influence or consequences, to destroy the animal, if timely notice of the danger had not been given by the presence of the above disagreeable sensation. Hence pain is really designed as a salutary warning of the approach or presence of evil; and as the Creator has bestowed upon his creatures the powers of sense for knowing and recollecting the things injurious, and also the capability of voluntary motion for flying from and avoiding these things; so has he beneficently placed it in their power to shun both the evil and the pain, by a proper use and exertion of the faculties which they possess. While, on the other hand, pleasure is made to accompany all those other circumstances, innocent in their nature, or serviceable from their consequences; and which compose, in a state of nature, by far the greatest portion of the chain of active life.

Instructed by these beneficent and efficient principles of natural government, we should regulate our command of the horse accordingly. Pleasure conveyed to his mind by proper methods, should be made the inducement and reward of obedience;

and acts performed from this gratifying impulse, will be always found to be better, and more energetically accomplished, than when they are forced from a less agreeable cause; whilst the infliction of pain should be religiously withheld on all occasions but those that are really productive of mischief or danger.

As it is gratifying to behold this noble and generous animal proudly pleased in pleasing a master of judicious management, so is it equally grievous and painful to see him poor and emaciated from starvation or excessive slavery, whipt unfeelingly on to exertions beyond his strength, or in despight of the anguish arising from long continued diseases of his feet. And yet, cruel and unjust in the extreme as such treatment of a sensible and generous being must be, how frequently does it disgrace a society, calling itself civilized and humane? How often, in the public coaches we step into, are our feelings agonized by the incessant torture of some poor, lame, or worn-out animal? He steps short, from pain and lameness in his feet, or the poor creature is weak from old age and excessive labour, and therefore cannot keep pace with the other horses. The coachman whips—and swears—and whips again, but in vain—nature is exhausted, and stripes are inflicted to no other

purpose than torturing the wretched invalid. Surely such cruel abuse of a sensible and willing being as this is, calls loudly for reformation; and this may soon be effected by the public showing, on such occasions, of cruelty, a just reprehension; and also, by giving the preference invariably to such coaches as are drawn by the best horses. The latter would involve the interest of coach-owners, and force them to relinquish the inhuman practice of driving under their coaches such diseased and emaciated animals; and whose constant torture from the whip must chase from the feeling passenger every pleasing sensation which the country through which he rides, with its views may create: for who can be at ease while he sees and hears a poor, sensible, and helpless creature abused and tortured for not performing what is evidently beyond his strength; or because he cannot suppress the disease and anguish which time and ignorance might have produced in his feet, and move on gay and sprightly like his more healthy and younger companions? The persons who can witness this treatment, and their feelings be still composed, either do not think, or forget, that the horse is a sensible being, capable of feeling pleasure and pain, partly like themselves; or their interestedness to pass on and arrive at the end of the jour-

ney, stifles the indignation they should feel at this inhuman breach of natural justice.

Another occasion for exciting regret, and which but too frequently occurs even in the public streets of the metropolis, is the savage abuse which the horse receives from supposed stubborness, in not moving sideways or backwards, exactly as the carter or waggoner orders. In an instant the reins are seized close under the head, and violently tugged backwards, to the injury and pain of the animal's mouth and jaws, which are often covered with blood in consequence: the horse exerts himself to obey his angry master, but in vain; some impediment behind prevents the waggon moving that way; or the horse, standing on a flat, smooth surface, has no firm hold for his feet, and therefore cannot use the necessary force; or it may happen that the waggon, being fixed behind, utterly opposes the horse moving sideways. But all these obstacles are overlooked by the incensed driver; he again tugs at the bridle without effect, and, clubbing his whip, in the fury of his rage, continues brutally striking this unfortunate animal about the head and face, either till his own violence abate, or some humane person come up to rescue the creature. Happily such acts of cruelty, and which really are calculated to brutalize youth,

are within the cognizance of the law; and if the persons who unfortunately happen to witness such a scene, would but feel it their duty, as it really is, to take the proper steps for bringing the offender to justice, this barbarous violence must shortly be suppressed.

But what, I believe, does not come immediately within the operation of the law, and which yet calls loudly for prevention, is burthening the unfortunate horse with excessive loads: this evil, I am aware, is provided against with respect to stage coaches, though still too often practised even by these. But there is a case, from the nature of the load, which deserves particularly to be brought within the range of justice; we mean the circumstance of crowding too many persons going to, or returning from fairs, markets, &c., into a cart or other small vehicle, drawn only by one horse. How painful is it, on these occasions, to behold a poor animal, labouring, almost breathless, along, and dragging after him a cart overloaded with passengers, who seem to have no other feeling besides that of urging the carter to whip and drive on, that they may arrive in time at the wished-for place. This custom, undoubtedly cruel, and no additional proof of increasing civilization, may certainly be easily suppressed, by levying a fine when the per-

sons riding in a cart or other carriage, drawn only by one horse, exceed a certain number, to be defined by the law.

Before we quit this subject, it will be necessary to take notice of two useless and cruel practices; viz. cropping the ears, and docking the tails of horses within a few inches of their hind-quarters. The first practice is painful and injurious to the animal, as will be more fully shown, when we come to the description of the horse's ear: but the second custom, or docking, is not only really barbarous, from the cruelty of the operation, but is also dangerous, and sometimes attended with fatal consequences. This operation is performed as follows:—First, the horse is put to the torture by the application of a twitch or two, the one to his upper lip, and the other to his ear; these, producing extreme anguish from their pressure on the parts to which they are applied, are intended to keep the animal steady; it being in the power of the persons holding the twitches to increase the pain, by shaking or turning them further round, and, by that means, to compel the horse to be quiet; and, as a further security against the resistance of the animal, a cord is made fast to his neck, and thence carried round the fetlock of one of his hind legs, and brought back again to the

neck, so as to raise the leg from the ground, and keep it in a state of incapability of striking out. —Now, it must be evident, that the twitch on the upper lip, from twisting and closing the nostrils, greatly impedes respiration, and that, as the operation takes up several minutes, and the horse does not breathe through his mouth, the poor animal is subjected to the pangs of partial suffocation.

The horse being thus bound, the operator proceeds to cut off his tail: this he soon effects with a sharp, powerful instrument; generally cutting through the whole of the tail, although of the thickness of one's wrist, at one effort. But now only a portion of the operation is ended; the principal and more formidable part is to follow: from the arteries of the divided tail issue four or five large streams of blood; these vessels, therefore, must be closed, otherwise the animal would die from hemorrhage. With this view, then, a burning hot iron, of a circular form, is applied to the whole of the raw surface, consisting of the divided skin, muscles or flesh, cartilages, spinal marrow, and nerves! The wretched sufferer now cries out from excess of torment; and making efforts to break from his misery, is forced into quiet by the shaking of the twitches! Some powder of

rosin is now strewed over the burnt surface of the tail, and another hot iron is applied to melt the rosin, and complete the searing, so as to prevent bleeding: and again the horse endeavours to break loose from these fresh agonies; when, being overpowered, and becoming faint from his struggles and excess of pain, he generally remains quiet till the whole of the operation is concluded.

Fatal consequences have, more than once, attended the custom of docking horses' tails within a few inches of their quarters, where the spinal marrow must necessarily be divided. Out of about a dozen horses thus operated upon, one old horse died under the operation. Another horse, that had been docked some time before, also died in consequence of a violent inflammation extending to the anus, and which totally closed up this passage from the body: and a third instance of fatality occurred, in the case of a horse, which was seized with locked jaw soon after being docked.

Besides the danger attendant on this useless and cruel practice, the poor animal is capriciously deprived of a principal ornament to his figure. What can be more unseemly, particularly with respect to mares, than to see a little shabby stump of only a few inches, with but a few short hairs, in place of a proper length of tail; and further, by cutting off

the tail within a very few inches of the quarters, the horse is unjustly deprived of his only means for beating off dust, flies, and other insects, which so frequently tease, by irritating the contiguous sensible parts.

Ignorance, but, in some cases, deception, has had recourse to close docking the tails of draught-horses, with the view of making the hind-quarters appear larger and stronger; but, in truth, no such effect takes place. Nature, who is the wisest framer of animal bodies, constructed the tail for essential use, and supplied sufficient juices for the constant nourishment of that, together with the animal's whole body. Surely, then, there can be no occasion of cutting off one part of the animal to give strength to another part of his frame, as if nature, short of means, was obliged originally to form some parts of the animal machine at the expense of the nutriment due to another part; and which would be ridiculous to suppose, and is contradicted most particularly in the frame of the horse, where we see a redundancy of nutriment generally existing, and which requires constant and great exercise, to prevent it running into disease.

The fact is, by cutting away the tail, so as to leave but a shabby stump, the relative appearance of the quarters is increased, without any real ad-

dition to their size; nor will any absolute change of size take place, but the diminution of that of the tail, which, however, being calculated to impose on the unwary, is practised with the view of giving the appearance of greater strength and fulness to the hind-quarters of horses, really deficient in both.

OF THE

ORGANS OF SENSE.

THE mind, as we have said in the general sketch, having the charge of the frame; and this being in constant correspondence with material objects around, it was requisite there were organs so constructed as to be able to receive and transmit to the mind, for its information, the different impressions which these objects may make; and, accordingly, we find that the eye is capable of being impressed by light, and the ear by sound; that the nose is adapted to smell, the mouth to taste, and the skin to feeling.

OF THE EYE.

The eye of the horse being an organ of much importance, and frequently subject to disease, it is highly essential to those persons who wish themselves capable of forming a right judgment of the soundness or unsoundness of the animal, to be particularly informed in its structure and economy.

The eye is lodged, for its security, in the orbit, formed partly by the bones of the skull, and in part by those of the face, as in the human subject; but it differs from the eye of the latter in some particulars. The horse, for instance, is without eye-brows, and the upper eye-lid alone is furnished with eye-lashes, excepting a few straggling hairs, which grow from the lower lid. Also there is a seventh muscle, as was before observed, for drawing the horse's eye inwards from injury, and which is not to be found in man. And the more effectually to protect this tender organ in the animal, there is a cartilaginous substance, called by farriers the haw, but by anatomists the membrana nictitens; and which, when forced out of the orbit where it is lodged, by the action of the retractor muscles drawing the eye farther into the socket, covers a great portion of the anterior part of the horse's eye. This provision against injury, and which is unnecessary in man, who is furnished with hands, is very complete in birds; the haw, in these creatures, covering the whole fore-part of the eye, and serving as an eye-lid during their sleep. In other respects the horse's eye differs not materially from that of man, excepting that the transparent fore-part of the former is considerably more extensive

than it is in the latter, and consequently the horse possesses a greater capacity for vision.

At the back part of the eye there is a large quantity of fat, for protecting that delicate organ from the inequalities of the orbit; and also, by keeping it smooth and moist, to prevent friction in its different motions. And besides the protection it receives anteriorly from the eye-lids and haw, this part is washed by a fluid, called the tears, which is secreted from a small gland, situated near the outer angle of the lids, and being spread by the action of the eye-lids over the whole anterior surface of the eye, not only keeps it moist and transparent, but also serves to remove dust and other injurious substances. The tears, having rendered these services to the eye, pass off by two openings at the inner angle of the eye-lids, and are thence conveyed into the nose by a canal, the termination of which may be seen in each nostril. This canal, though not large, is capable of having fluids injected through it to the eye, or from the eye into the nose; but care should be taken, that the fluids to be injected are of a mild quality, otherwise the membrane lining the canal is in danger of becoming inflamed; in which case, the passage of the tears being obstructed, they will be forced to flow over the face.

Another fluid, of a mucous quality, is secreted from the surface of the membrane lining the eye-lids, for the defence of the eyes against the irritating nature of the tears. This membrane, called conjunctiva, not only lines the inside of both eye-lids, but is reflected over the whole fore-part of the eye, and consequently serves to keep the eye in its proper situation, and prevents all extraneous bodies from insinuating themselves behind it. It varies in its structure according to the nature of the parts it covers: the portion spread on the anterior part of the eye is transparent, and but little vascular, while that lining the lids is full of vessels, as may be seen in inflammation of the eye. We shall now pass to the eye-ball, or that part of the eye which is directly engaged in vision.

The globe of the eye is of a roundish shape, and may be divided, for sake of description, into two parts; viz. the one transparent, and the other opake: the former constitutes the whole anterior portion, which is pellucid, for transmitting the rays of light, and is very extensive in the horse; the latter comprizes what is termed the white of the eye; it commences at the circular edge, or termination of the transparent part, and, running backwards, covers the entire posterior portion of the eye-ball. The opake part serves principally to en-

close and defend the transparent and more delicate parts of the eye, and to limit the transmission of light; and it is composed of the following parts; viz. the external, white, dense coat, covering the whole posterior part of the eye: this, from its hardness, is named the sclerotic coat; it is but little vascular, and is seldom diseased. On the internal surface of the sclerotic is spread the second coat of the eye: it is a delicate, soft membrane, and is well adapted for the expansion upon it of the optic nerve. This coat, called choroid, is also opake, and differs, in appearance, in various creatures, being black in some, white in others, and variegated in several animals. This difference of colour depends on the pigment lining the surface of the choroid coat; and to this is to be ascribed the peculiar colour of the pupil of the eye in different creatures. In animals with white furs, as white rabbits, &c., the choroid coat being white, the eyes appear of a red colour: this also is the case even in the human subject, with persons having very white hair and eye-lashes; the pigment covering their choroid coat being generally fair, the pupils of their eyes also have a reddish hue. But the pigment of the human eye being in general black, the pupil, in most persons, also appears black, or nearly so. The use of the black pigment, besides

producing the various and beautiful shades, from the soft light blue to the deep sparkling black, which we see in the human eye, is to absorb and render useless the superfluous and superabundant rays of light transmitted to the bottom of the eye; and which, if not thus absorbed and rendered harmless, may irritate and injure the retina, or optic nerve, or otherwise confuse vision. And hence we may know the reason why dark coloured eyes are generally stronger, and better enabled to endure much light, than are the light coloured ones; for the black pigment on these being less in quantity than it is on the former, the light eyes consequently have not an equal power of absorbing and moderating the rays of light as the dark coloured ones, but receiving them with comparatively little diminution, their force is too great for the retina to endure; it becomes irritated, and the person is forced to close, or nearly so, his lids, to exclude the stimulus of the light, either in whole or in part.

The pigment on the choroid coat of the horse's eye is black at its lower part, but of a light green superiorly; and from the combined effect of these two colours arises the greyish appearance of his pupils. The choroid coat after lining, as we have said, the whole posterior surface of the eye, ex-

tends towards the anterior part of this organ: here its edges are thrown into folds for the purpose of occupying less space; and inclining inwards towards the chrystalline lens, these folds, now called ciliary processes, attach themselves all round its circumference. These also are lined with black pigment, and serve to confine the passage of the rays of light to the lens. But what principally directs and limits the rays of light passing into the eye, is that circular curtain in the transparent part of this organ, and which we see extending from the white part all round to the opening in the centre called the pupil, and which is the passage through which the rays of light are transmitted to the nerve at the bottom of the eye. This curtain is termed iris, and has a muscular power, as may be seen in the enlargement and diminution of the pupil, or central opening of the eye, but which in reality is occasioned by the spreading towards the centre, or the receding from it, of the iris; the pupil being simply the opening formed at this part by the central edge of the iris. In a strong light, or when we want to view some very minute or near object, the iris contracts the pupil, by which the rays of light passing into the eye are greatly limited; and on the other hand, the pupil is seen to be widely di-

lated when there is but a faint light, or when the object to be viewed is at a great distance. The iris, like the choroid coat, owes its colour to that of the pigment with which it is lined: in the horse it is generally of a cinnamon colour, which appears to be least liable to disease; but sometimes the iris is white, which is the cause of what are called wall-eyes in horses. The pupil of the eye differs in shape in many creatures: in man it is circular; in the horse, horizontally oblong; and in cats, perpendicularly oblong: hence the sphere of vision is different in the eye of each, owing to the capacity of its pupil. Thus the human eye having a circular pupil, sees equally well at all sides, while that of the horse has a wider range of vision at each side, and the cat's from above downwards.

The optic nerve descending from the brain passes through an opening in the bony orbit, and enters the back part of the globe of the eye in a trunk tolerably large; and having penetrated the sclerotic and choroid coats, already described, it then expands upon the latter into a delicate and partly transparent membrane, for receiving the rays of light transmitted to it by the transparent parts of the eye. It is now termed retina, and

constitutes the third coat of the eye; on it are painted the various objects we behold, and it is the seat of the sensation of light.

We now come to the lucid, or transparent parts of the eye, and which constitute a principal share of this organ; they consist of pellucid membranes and humours arranged in the following manner: —First, the transparent cornea completes the globe of the eye at the fore-part, its circular edge running all round to be attached to the sclerotic opake coat, just as the glass of a watch is joined to the case beneath: this membrane is of a hard texture, and serves to confine the waters of the eye; and also, by its convexity, to refract the rays of light passing into the eye. Immediately behind the cornea lies the aqueous humour; it is a clear, thin, watery fluid, as may be seen on cutting the cornea, when this fluid will escape. This aqueous humour occupies the space between the cornea and the crystalline lens, and is partly divided into two portions by the iris, which floats like a circular curtain in this humour. The use of the aqueous fluid is, first, to support the convexity of the lucid cornea; and, secondly, to assist the latter in effecting refraction. The crystalline lens is the next humour of the eye to be described.

It is partly of a globular form, transparent, and tolerably hard in consistence, particularly towards the centre: it lies immediately behind the aqueous fluid, and has the vitreous humour (to be next described) between it posteriorly, and the retina or optic nerve. The lens is retained in its situation partly by these humours, and, in part, by the ciliary processes; and which (when speaking of these) we said, attached themselves all round to its anterior surface, for the purpose of confining the passage of the rays of light to the lens. The function of the lens is similar to that of the other transparent parts; but owing to its greater convexity and density, it accomplishes refraction in a much greater degree than they do. Between the lens and the retina is situated the remaining humour of the eye: it is called vitreous, from its resemblance to fused glass, and is a little hollow on its anterior surface for lodging the back-part of the lens. This humour consists of a fine pellucid fluid, contained in a clear cellular membrane, as may be seen by cutting this membrane, when the fluid will escape drop by drop. The use of the vitreous humour is to complete the refraction of the rays of light just before they fall on the retina, which is behind it.

OF VISION.

The eye effects vision through the means of light; for the rays passing from the objects we see to this organ, enter its transparent part, and are transmitted backwards to the retina, or expanded nerve, at the bottom of the eye. Here the rays impress the nerve, producing the sensation of light, and also of the figure, colour, and motion of the objects viewed; and these sensations being propagated onwards by the nerve to the mind in the brain, there produce ideas or images of the visible properties of the things so creating impression; and thus the operation and intention of vision are completed. The eye, then, is an apparatus for receiving the images of visible things, in the manner of a mirror; and for transmitting them to the mind for its information: the latter operation is effected, as we said, by the nerve passing from the back part of the eye to the brain; and the former one is accomplished by the sensible or susceptible power of the retina or expanded nerve at the bottom of the eye, and which enables it to receive the images of objects as they are conveyed to the retina by the rays of light passing to it from these objects, through the transpa-

rent parts of the eye. Now, as the retina, the seat of impression, and delineation of objects, is extremely small, not being larger in man, than the section of a hollow globe of an inch in diameter, and being not greatly increased in the horse, in comparison to the vast range of vision extending for miles, and of which the eye is capable; it follows, that there was a necessity of making a provision in the eye for reducing that great range into a miniature size, otherwise the whole of it could not be painted, as we perceive it is, on the limited retina. For this purpose, then, are the transparent parts of the eye principally given, their great use being to refract and converge the rays of light passing from any object, so that the image of the object may be conveyed to the seat of impression in such a diminished form as is fitted to the size of the part. This conveyance, and consequent diminutions of the figure of objects, they effect by their convexity and density; it being a law in optics, that these properties produce refraction in proportion to the degree in which they exist. Thus the rays of light coming from some object of magnitude, as a house or tree, at no great distance, strike first upon the lucid cornea; penetrating this transparent membrane, they pass on,

converged in proportion to the density and convexity of the membrane, to the aqueous humour: here, in their transmission, they become further converged, and entering the crystalline lens, and vitreous humour, their convergence is completed; and the distinct figure, in miniature, of the object falls on the expanded nerve, and produces that impression we call vision. We will now proceed to describe the diseases, with their symptoms and mode of cure, to which the horse's eye is liable: and, first, of ophthalmy.

OF OPHTHALMY.

This consists in an inflammation of the conjunctiva, or membrane, lining the eye-lids, and reflected over the fore-part of the eye; it first attacks the part lining the lids; then that on the white, or opake, coat of the eye; and, lastly, the portion spread over the transparent cornea. In the former parts it produces great redness and fullness of the blood-vessels, as may be seen by gently drawing either lid from the eye; while in the latter, or transparent part of the eye, a dullness, or film-like appearance, is the consequence. The tears are, at the same time, so much increased as to flow over the face; the lids are

partly closed, to exclude some of the light, and which would now be painful and injurious to the eye, rendered irritable by the inflammation; and the more effectually to avoid irritation from abroad, the animal draws the diseased eye farther into the orbit, by means of his retractor muscle, which, at the same time that it effects this motion, forces the haw, as we before observed, outwards, to increase the protection of the eye. Some persons mistaking the haw for an excrescence produced by, or producing, the disease, used to cut it away, and, consequently, deprived the horse's eye of a material part of its defence; but now its use beginning to be understood, it is rarely removed, except by the most uninstructed practitioners.

When the above symptoms are caused by blows, or other accidents, a cure is soon effected by bleeding, and giving the following laxative ball * twice or three times, after an interval of a few days between each, and keeping the animal at rest,

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* LAXATIVE BALL.

Barbadoes aloes	3 dr.
Castile Soap	$2\frac{1}{2}$ dr.

Syrup to form one ball.

and on a cooling diet: and should any speck, or appearance of opacity, remain on the transparent part of the eye, after the inflammation has subsided, a little finely powdered salt blown on the part through a quill, once or twice a day, will gently stimulate the absorbent vessels, and shortly remove the opacity.

OF MOON-BLINDNESS.

But inflammation of the eye more frequently depends on constitutional causes: when this is the case the disease is more difficult of cure; and frequently, notwithstanding all the remedies employed, will terminate in blindness of one, or both, of the eyes. It commences without any apparent cause: first, by the watering of the eye, and closing the lids, when all the other symptoms we have described follow. After a certain time, and more particularly if proper remedies be administered, these symptoms will subside, the eye will appear to be restored to its healthy condition; but now the other eye becomes inflamed, and running through all the diseased stages like the former one, it also recovers; and the inflammatory affection, after a short intermission, flies again to the eye first diseased. And thus the inflamma-

tion generally continues to attack the eyes alternately, producing what is commonly called moon-blindness, from the circumstance of the interval between the returns of the disease being about a month; till a cataract taking place, total blindness of one or both eyes ensues.

This disease most commonly attacks horses between the fifth and seventh years of their age, rarely commencing before or after that period: and it is to be found more frequently amongst horses kept in close warm stables, than in those that are inured to cooler and more airy situations; and also oftener in horses highly fed, and not proportionately worked, than in those whose food and labour are more fitly apportioned to each other. Hence it is reasonable to conclude, that plethora, and the volatile pungent effluvia, which are constantly rising from the urine and fœces, and which so sensibly affect us on entering a hot stable, are amongst the principal causes of this disease: and, accordingly, the best preventatives against this, and indeed many other diseases of the horse, as will be shown in the course of these pages, are, first, a wholesome, airy, clean, stable; secondly, regular exercise, fully apportioned to the condition and diet of the animal; and, lastly, a gentle dose of physic, occasionally given, to

prevent any disposition to plethora, or local inflammation.

When the inflammation is constitutional, the cure, as we have said, is doubtful; particularly if the proper methods for removing it be not had recourse to in time. It will be requisite, then, on the first appearance of the disease, to bleed freely, to give the following purge* to the animal, and confine him to a cool opening diet; and also to give him one of the doses, each evening, in his corn, of the following diaphoretic powder, for promoting a regular perspiration at the surface, and which in this disease, is much decreased. A seton passed through the inflamed conjunctiva, and a rowel placed under the jaw, are often of service; as is also a blister applied contiguous to the inflamed eye. When the inflammation is suppressed, exercise, regular and full, with an oc-

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* PURGE.

Barbadoes aloes	7 dr.
Castile soap	½ oz.

Syrup enough to form one ball

DIAPHORETIC POWDER.

Tartarized antimony	1½ oz.
Nitre	4 oz.
Powdered rosin	5 oz.

Mix for twelve doses.

casional purge, is to be principally depended on for preventing the return of the disease. But should these precautions fail, and the inflammation again attack the eyes, the following disease, called cataract, will most commonly ensue.

OF THE CATARACT.

The inflammation we have been above describing continuing to spread to the more internal parts of the eye, at length reaches the crystalline lens, and produces opacity. At first an opaque small point only can be perceived in the centre of the lens by looking into the eye; gradually, but slowly, this point of opacity increases, till at length it extends through the whole substance of the lens, causing it to appear white or yellow, and inducing blindness. For the rays of light being wholly obstructed by the lens, now rendered opaque and impenetrable by inflammation, are not permitted to reach the retina, where alone they can make an impression, and, consequently, vision is totally precluded. In the human subject this obstruction is frequently removed, and sight restored, by the extraction of the diseased opaque lens: but this cannot be so well done in the horse, it being extremely difficult to fix his eye,

so as to perform the operation with success: and further, should the lens be successfully extracted, and the wounded parts heal, it would be next to an impossibility to keep the proper glasses applied to his eye; and without which, his vision must be confused, and rendered more injurious than total blindness.

OF THE GUTTA SERENA.

This disease, known to some persons under the term glass-eyes, from the circumstance of the eyes appearing unusually clear and glassy, but seldom affects the horse. It is an affection of the retina, or expanded nerve, at the bottom of the eye, and generally has its cause in injuries or affections of the brain. In this disease, the pupil may be observed to be much enlarged and dilated, owing to the insensibility of the optic nerve, and which is now incapable of being stimulated by the light. If the affection be recent, as from staggers or blows, stimulating remedies, such as the fumes of vitriolic acid and salt, applied to the nostrils, and blistering the head, may be of service; but should the disease have continued for a considerable time, it will not admit of a cure.

OF THE EAR.

The ear of the horse is a very important organ; and although it exhibits no appearance of any particular disease (except from external injuries), or if it be subject to disease the symptoms escape our observations; yet it being the organ by which the animal effects hearing, which is naturally a very acute sense in the horse, and also the principal channel by which we convey to him our commands, our approbation, or censure; much of his steadiness and good conduct depends on its perfection.

The ear of the horse, like that of man, is divided into the external and internal parts: the former comprizes all that portion, which is visible, and external, to the temporal bone of the skull; the latter, the parts contained within that bone. The external ear collects the different sounds borne on the air, and transmits them to the internal part, which is the seat of hearing. We shall briefly sketch the structure and economy of this part, and afterwards speak more fully of the injurious management of the external ear.

The internal ear consists, first, of a canal of considerable length, lined with a fine membrane, and furnished with numerous small hairs,

for preventing the passage of insects, or other injurious bodies, to the parts within. The inner extremity of this canal is closed by a thin membrane, set in a bony circle, and somewhat resembling a drum-head: under this membrane passes the branch of a nerve; and a little beyond it, is situated a small cavity, termed the drum of the ear. This cavity contains four small bones, connected together in the manner of a chain, and having muscles for their movements. The cavity has four openings from it; the first is a small canal, which communicates with the back part of the mouth; the other three openings lead to different recesses of the ear; one of these openings runs into the labyrinth, which is a cavity much smaller than the drum of the ear, and having three semi-circular canals opening into it by both their extremities; and also a spiral canal, which, after making two turns and a half, communicates with the above cavity. The labyrinth, and all its communications, are lined with a very fine membrane, and are filled with a thin fluid, which transmits to the nerve the vibrations it receives. In what manner exactly hearing is effected cannot be easily known, from the variety and minuteness of the parts composing the internal ear; but it is certain that the auditory nerve distributed over the laby-

rinth is the seat of the sense of hearing; and that a certain modulation of the air, collected by the external ear, and conveyed through the canal first described, to the membrane closing the drum of the ear, and thence communicating its vibrations to the nerve in the labyrinth, is the cause of hearing.

OF SINGEING THE EARS.

Now, as the internal ear is necessary to effect the sense of hearing, and that on its healthy condition the perfection of that sense greatly depends, so also is the external ear essential for the collection of sounds conveyed through the medium of the air, as all sounds necessarily are; and with this view, nature has formed the external parts of the horse's ear, so that it may, by its length and funnel like shape, receive and convey to the internal ear, the seat of hearing, the slightest vibrations of the air occasioned by sound; and that these vibrations may strike against the internal ear in a proper modified manner, and also that insects and other offending substances may not be able to gain access to this delicate sensible organ, the external ear is furnished on its internal surface with a short down and numerous hairs for defence. This useful defence, however, is often injudi-

ciously removed by ignorance and caprice: the means mostly used for its removal are by the scissars or the flame of a candle: the latter is the more cruel method; for, besides the pain created to the poor animal by the blisters which sometimes rise on the ears from this mode of singeing, a twitch applied to the other ear, or to his nose, to force him to remain quiet during the operation, adds considerably to his misery. But this wilful affliction of a sensible being with pain, is not the greatest evil; removing the down and hair of the external, also does away the defence to the internal ear; and the sounds, now no longer modulated as before in their passage to the latter, strike it harshly and disagreeably, frequently causing the animal to start, and to become unsteady, to the imminent danger of the rider. The bad effects of this practice are also sometimes seen on the road during rain and wind, when the horse travelling against them may be perceived to be unusually uneasy about the head, frequently moving his ears, and attempting to turn from the direction of the storm, but really endeavouring to avoid the irksomeness of the rain and wind, and which now have free access to the internal sensible ear. Deafness either wholly or in part, and which exists more frequently in horses than is generally sup-

posed, is another consequence of the above bad practice. Surely it cannot be imagined, that exposing a tender organ, like the internal ear of the horse, to the irritation of extraneous bodies, such as flies, dust, rain, &c. and which must necessarily have free access to it, when the downy defence of the external ear has been removed, will not be attended with the bad consequences which usually follow the abuse of other sensible parts.—The eye will inflame from irritation, so also will the muscles or flesh; and this inflammation will produce either a temporary or permanent suspension of the function of the part. Why then may not this also happen to the internal ear of the horse—its parts are nearly as delicate and as susceptible of injury as are those of the eye: inflammation of the latter, we have seen, often terminates in blindness; and shall it then be thought that inflammation of the ear may not produce deafness?—It is more reasonable to suppose that it does; and the dulness and stupidity of many horses, and which are generally mistaken for sullenness, are more justly to be attributed to some defect in the sense of hearing, than to any disposition to stubbornness in the animal. By deafness, the horse is not only subjected to many cruel punishments for supposed obstinacy, but also a very

principal channel of his pleasure is destroyed: the horse is a spirited, sportive animal, and takes great delight in certain sounds, which, when his ear is perfect, he hears at a great distance. Every one acquainted with horses, must have observed their pleasurable emotions even in the stable, when hearing the cry of the hounds, or the sound of the trumpet and other musical instruments.

OF CROPPING.

These objections apply with still greater force against the barbarous custom of cropping the ears of a horse. In the former case, only the down and hair protecting the internal ear, were removed; and this we said was sufficient to produce the inconveniencies stated; but, in cropping, the principal share of each external ear is removed altogether, and consequently the evils resulting from the former practice must be greatly aggravated.

OF THE NOSE.

This is an extensive and important organ in the horse: extensive, because it reaches from the forehead down to the lower extremities of the nostrils, and occupies laterally the principal breadth of the face; and important, from being the chief seat of that destructive disease, glanders. The nose is

constructed of bones and cartilages, which serve as walls for preserving its cavities; and also of small muscles, for dilating and contracting the nostrils: it is divided in the middle by a bony partition, and the whole of its internal surface is lined with a soft moist membrane. This membrane is the seat of the sense of smelling: the subtle, invisible, and volatile effluvia of bodies, being conveyed by the air in inspiration through the nose, strike against the numerous branches of the olfactory nerve, which are abundantly distributed over this membrane, and kept moist by a constant secretion of mucus; and produce those sensations we term smelling. This sense is much more acute in many quadrupeds than in man; they having frequently to scent out their food at a considerable distance, and to select, by the smell, what is fit for them from much that is improper and injurious. The sense of smelling is very perfect in the horse, as may be perceived by his nicety in the choice of food, and also on other occasions.

OF GLANDERS.

This is the most destructive disease afflicting the horse, being highly contagious, and almost universally fatal. The symptoms are a swelling

of the glands under the throat, and a discharge of purulent matter from the nostrils: most commonly the discharge is confined to one nostril, and the inflammation is also limited to the gland on that side. Soon after this, the membrane lining the inside of the nose ulcerates, as may be seen by looking into the nostril, and the discharge becomes of a worse colour, and fetid: the ulceration now spreads; the thin, delicate, bony parts of the nose are destroyed by the virus, which is increased in quantity and virulence, and the whole system of the animal being at length affected, the vital functions gradually fail, and death closes the progress of this cruel disease: but its progress to destruction is more or less rapid in different horses: some it kills in a comparatively short time, while other horses not only sustain their condition, but are also able to endure work long after they have been undoubtedly glandered. This practice, however, of preserving glandered horses while they are capable of affording service, and which but a mistaken interestedness of the owner can approve, is highly injurious to the nation at large, and therefore ought not to be permitted.—A horse labouring under glanders may be considered a machine which is constantly generating and scattering around him the glanderous poison;

every thing to which he applies his nostrils has this poison deposited on it; the manger and rack from which he eats, the pail in which he drinks, the collar, bridle, and clothes he may have on, all are infected; even the parts of the stable that are contiguous, but with which he may not have had absolute contact, are not exempt from the infection of this dreadful disease: the glanderous matter on the membrane of his nose, carried forth by the air which he expires in breathing, vitiates the atmosphere around him, and spreads the seeds of further infection to a distance from the animal.

At present there is no effectual remedy known for preventing or curing this disease: from a corresponding appearance between some of its symptoms with those of the venereal disease, and seeing the effects of mercury in curing the latter, various preparations of quicksilver, in different doses, have also been given to the horse, with the view of curing the glanders, but not with the same happy effect. This failure, however, should not preclude the hope that a specific remedy for at least suppressing the mortality of the distemper, may not, ere long, be discovered. The cow-pock was not thought of as being an infallible preventative against the mortality of the small-

pox, and a successful remedy against this virulent and frequently fatal disorder was beginning to be despaired of, until the sagacious Jenner made the immortal discovery; a discovery which, in some measure, atones to humanity for the unparalleled destruction of the species, committed by the then existing ruinous and barbarous war. It is probable that a certain preventative against the mortality of the glanders also exists in some milder and more original disease, and only waits a few lucky circumstances to be discovered by some sagacious observer. It was thought the cow-pock would have had the desired effect, and accordingly the horse was inoculated with it, but without success.

It is admitted that glanders is generally spread by contagion; but it is also supposed, cases occur where this disease arises spontaneously. The latter supposition, however, rests merely in suggestion, where the disease cannot be traced to a contagious source; but considering the subtlety and virulence of the poisonous matter generated and constantly deposited by a horse infected with the glanders, it is not unreasonable to believe that this disease, in all cases, is produced by contagion. A neglected cold, ill cured strangles, and the breathing impure air, have been thought to be productive of glanders; but is it not possible that

incipient glanders might have been mistaken for the two first diseases; and that in the case of breathing foul air, the animal might have received the infection into his system prior to being placed in so noxious a situation. These, however, are suggestions also, unproved by facts, which can alone enable us to draw certain conclusions with regard to diseases; and they are offered here principally with the view of inducing practitioners of talent and observation to direct their views to the discovery of a preventative against the mortality of this dreadful disease.

Until, however, a remedy be discovered for preventing or curing the glanders, every horse certainly known to be infected with this disease, excepting such as may be left with skilful practitioners for experiment, ought to be immediately destroyed, with the view of preventing the extension of the contagion to other horses; and which, if the infected animal be permitted to live, must take place: but care should be had, that a cold or strangles be not mistaken for glanders, and the horse be improperly doomed to death. To preven such error, it will be necessary to discriminate between the symptoms of the different diseases: in a cold, there is mostly some fever with a cough, and the discharge at the nose is generally from

both nostrils, which are never ulcerated. In the glanders, particularly in its early stages, there are neither cough nor fever; the discharge is mostly confined to one nostril, and there is always ulceration after a certain time. Again, strangles differs from glanders in this; that the inflamed glands under the throat soon run to suppuration in the former disease; and, discharging their matter, the animal gets well; whilst, in glanders, these glands are scarcely ever known to inflame actively and suppurate.

When then a horse is observed to have a discharge at the nose, he should be instantly separated from all other horses, until the nature of the discharge be known; when, if it proceed from glanders, the animal should be immediately destroyed, and with him the things he was most likely to have infected, as the collar, nose-bag, &c.: and it will be requisite afterwards to wash clean the rack, manger, and other places on which he may have deposited glanderous matter; and to ensure safety against further contagion, a coat or two of lime should be given to the stable inside.

OF THE TONGUE.

The shape and appearance of the tongue of the horse is so generally known, as not to require a

description. It is composed of several small muscles, all which unite to form the substance of the tongue: these muscles arise from the os hyoides or tongue-bone, (which we have described when speaking of the skeleton), and from the contiguous parts; and from these different origins they are enabled to effect its various motions. The tongue is of great assistance, in the place of hands, to brute creatures, for taking food into their mouths: it is also chiefly engaged afterwards in the preparation of this food by mastication, for entering the stomach: but a principal use of the tongue is to distinguish flavours; and this power is so great in brute animals, who are incapable of being instructed by each other, like man, as to enable them to avoid, by the taste, all unhealthy or poisonous food. This sense of taste resides in the nervous extremities distributed over the surface of the tongue; and hence the papillæ on the tongue of many quadrupeds, and to which these nervous branches are plentifully supplied, are peculiarly long and numerous.

The horse's tongue is sometimes liable to wounds and injury from the bit or from his teeth, so as to cause him to refuse his food: in this case his mouth should be carefully examined, and the

cause being discovered and removed, the animal will feed heartily as before.

OF FEELING.

Though this sense exists in every part of the frame possessed of sensibility, yet it more particularly belongs to the skin, for giving the animal notice of the nature of such things as he may happen to be in contact with, and that he may avoid and fly from those that are injurious. This sense is very fine in man, enabling him to examine the exterior properties of bodies, such as their solidity, roughness, &c.; but in the horse, whose skin is covered with hair, it is necessarily much duller; and whatever power this part of the animal may possess for discriminating substances by the feel, it resides principally in the skin, covering the lower extremity of the nose and fore-part of the lips; and the superior sensibility of these parts, perhaps, is the reason why they are so frequently tortured by the application of the twitch, an application painful and injurious, and which should never be made but in cases of absolute necessity. The remainder of the horse's skin, however, is not without its feeling: on the contrary, it is endowed with a high degree of sensibility, as may be seen by the uneasiness of the animal from the irritation

caused by flies, dust, &c. lodging on the skin, and the efforts he uses to rid himself from the offending matter. But this feeling differs in degree in different horses, being always more acute in young horses than in old ones, and much finer in what are called blood-horses than it is in the heavy draught kind. The first difference is owing to the change which age effects in animals as they grow old; for then the marrow, which before afforded a soft moist bed to the nerves, is nearly all absorbed; the nervous fibres become rigid, and sensibility is proportionably lessened in consequence. The superior sensibility of blood-horses arises from a more abundant distribution of nerves over the frame, and which consequently convey, to every part of the animal to which they extend, the power of feeling: hence they are more delicate and susceptible of injury than are the coarser kind of horses; and this also is the reason, and not any different constitution of the blood, as some erroneously suppose, why blood-horses are likewise more active, lively, and energetic, than the heavy draught breed.

We have now viewed the organs of sense, as they are called, together with their functions in the horse: we have seen that the eye is given to effect vision; the ear to accomplish hearing; the

nose smelling; the tongue tasting; and the skin feeling: and the whole of their impressions being transmitted to the mind in the brain, inform it of such circumstances around, as it is the intention of nature should be communicated to the animal.

OF THE

BLOOD.

THE parts of the horse's frame being now described, on which its sense, motion, and figure depend; and these parts suffering a constant waste, we next come to those which are fitted for supplying the machine with new matter, and on which supply its health and energies greatly depend; and first of the blood.

The blood is principally formed from the food which the animal takes in, as shall be hereafter explained; and not only affords supplies for recruiting the frame, and enabling it to continue its secretions; but it is also from this fluid that all the parts of the body are formed. Its colour is mostly red in the larger animals, but in those of the lesser kind it is transparent, as it also is in some parts of the former: but even its redness differs in degree in different parts of the frame; in the arteries, it is of a beautiful vermilion colour; of a purple colour in the veins; and nearly black at

the right side of the heart. Blood, when taken from an animal, would appear to be a homogeneous fluid of a red colour; but being suffered to rest in the vessel into which it has been received, it soon begins to coagulate, and spontaneously separates into two parts; viz. a red coagulable cake, and the serum or watery fluid in which it swims: the latter is much less in the horse than it is in man; and is distinguished from the coagulating lymph, by not coagulating in the heat either of the atmosphere or body; but the serum, nevertheless, will coagulate in 160 of Farenheit's thermometer, when its properties are so changed that it will not be again soluble in water, unless a long time boiled in a digester. The red cake again may be divided into the red particles, which give the colour to the whole mass, and a pure coagulable lymph, remarkable for coagulating immediately after being drawn from the animal. The use of the red particles in the blood is not yet ascertained; they are larger in the fœtus than in a grown animal, and they also vary in size and proportionate quantities in different creatures: in the horse the red globules are somewhat larger than in man, but in the ox they are smaller: they seem to increase with exercise; and their quantity, compared with the mass, differs so much, that the appearance of

the blood serves as a criterion for judging the state of the constitution: thus, in diseases attended with weakness, the blood appears poor and colourless, owing to the diminution of its red globules, whilst these abound in the healthy condition of the frame, giving the blood a rich florid colour.

The coagulable lymph is a principal constituent of the blood, being that part which helps to compose all the solids of the body; it is found the most generally diffused over the animal system of any other part of the blood; and its elements are furnished by the food which the animal subsists on. How it becomes assimilated with the different parts of the body, into whose composition it is known to enter, for the purpose either of repairing its waste or injury, continues a mystery; but analysis shews that coagulable lymph is the basis of all the muscular or fleshy parts; and experience proves that it is also the regenerator of wounded parts, forming the bond of reunion between the fractured ends of bones, as also between the divided extremities of the nerves, tendons, &c. The tendency of the coagulable lymph to become solid when removed from the circulation, or after the death of the animal, and which ten-

dency no art hitherto employed has been able to arrest; and seeing that it preserved its fluidity whilst circulating in the vessels of the living animal, induced Dr. Hunter to revive the ancient opinion, that the coagulable lymph was alive, and which was the cause of its remaining fluid in the vessels of the animal. This tendency to coagulation, however, is less in some circumstances than it is in others: thus blood, drawn in inflammatory disorders, coagulates much slower than when taken away at other times; and hence we may judge when inflammation is present; for in this case the coagulable lymph being longer in coagulating, the red particles, which are the heaviest part of the blood, have time to fall to the bottom, leaving the blood of a buff colour at its upper surface.

We shall now pass to the description of those organs which force the blood into motion, convey it all over the animal machine, for repairing its waste or injuries, and which also accomplish the different secretions.

OF THE ORGANS OF CIRCULATION.

These consist, in the horse as in man, of the heart, the arteries, the veins, the absorbing vessels, and their glands.

OF THE HEART.

The figure of the heart is so generally known, as not to require description ; in size, it is much larger in the horse than it is in man, being, in the former, nearly equal with that of the ox. It is situated in nearly the centre of the body, for the better distribution of the blood over all its parts; and it is retained in its position partly by the great blood-vessels, which branch from its base; in part, by the pericardium or membraneous bag, in which it is included as in a purse, and which is fastened to the diaphragm behind. This membraneous bag exudes constantly a fine fluid, for keeping the surfaces of the parts that may come into contact, moist, and thereby preventing their friction.

The heart is the principal organ for propelling the blood into circulation ; and, with this view, it is constructed with four cavities for receiving that fluid, and also with a contractile power of its substance or sides, by which it forces the blood into motion. This contractile power is called its irritability, and is excited into action by the stimulating quality of the blood. The four cavities are placed two in each side of the heart, and are distinguished into what are called its auricles and ventricles : an auricle and ventricle belong to each

side, for receiving and propelling the blood into circulation in the following manner:—First; the auricle in the right side of the heart being filled with the blood conveyed to it from all parts of the body by two large veins, as shall be described, empties its contents, by a communicating passage, into the ventricle of the same side: this passage is provided with a valve, which permits the entrance, but prevents the return of the blood into the auricle. The right ventricle, being stimulated by the blood it has received from the auricle, contracts, and, communicating with an artery going to the lungs, it forces the blood to run in that course; but this movement, requiring greater strength than the expulsion of the blood from the auricle into the ventricle, the substance, forming the sides of the latter, is necessarily much thicker and stronger than that of the auricle: the outlet of the ventricle is also furnished with valves for preventing the regurgitation of the blood. This fluid, having circulated over the lungs, for a purpose to be explained when we come to speak of these parts, is conveyed back to the heart by eight veins, which open into the auricle at the left side of this organ: filling the left auricle, the blood is forced, as in the right side, into the left ventricle; and this cavity also contracting on the blood, it is propelled

through an artery which goes out from it, into a new circulation along the extent of the whole body.

Thus the heart may be considered a double apparatus, which sustains two different circulations; for its right side receives the blood returning to it from all the parts of the body, except the lungs, and then forces it through the vessels branching over these organs; whilst the left side, having also received the blood now returned to it from the lungs, propels it to every other part of the frame. The substance of the heart is muscular, being composed of red, fleshy fibres, like the other muscles of the body; and the fibres are so arranged as to enable it to contract in all directions for forcing out its contained fluid. The motion of the heart exists after the other muscles of the body have entirely lost theirs; thus the heart of a viper will palpitate in twenty-four hours after it has been taken from the creature's body; and hence, in apparent death from suffocation or drowning, although the pulse wholly disappear, and life seems to be extinguished, still the heart, retaining a latent power of action, if a proper application of suitable stimulants be used, will be again excited to renew its movements; when the circulation will consequently be restored, and life will be shortly

reinstated as before. It is on this principle the resuscitative process is used, and with so much success, in cases of drowning.

The heart of the horse may be felt beating against the ribs on the left side of the chest, after the animal has undergone violent or quick exercise, or when he is labouring under an inflammation of the lungs: in ordinary cases it is not very perceptible.

OF THE ARTERIES.

These are elastic tubes for conveying the blood from the heart to all the parts of the body. They arise by two great trunks from the ventricles of the heart, and afterwards branch in the form of a tree into innumerable ramifications. That arising from the right ventricle goes to the lungs, and is called the pulmonary artery; the one, continued from the left ventricle, is spread over all the other parts of the body, and is termed the aorta; and although of less diameter than the former, yet it is stronger and more firmly constructed. The arteries consist of three coats; an external one; a middle, muscular one, for effecting contraction; and an internal, elastic, and smooth coat for the easier passage of the blood; and, from this construction, it will be seen why they partake of the dilatation and

contraction of the heart; for the blood, being impelled by that organ into the arteries, causes their sides to be dilated, when their muscular coat contracting, their area necessarily becomes lessened, and consequently the fluid they contain is propelled onwards. This dilatation and contraction is called the pulse, and is perceptible in all the larger branches, but not in the very minute ones, unless inflammation be present. The course of the arteries is generally far from the surface of the body, which ensures their safety from external injury: some branches, however, as that of the lower jaw, runs close to the surface; and it is from this circumstance, and the jaw-bone serving beneath to resist the pressure, and prevent the artery receding from the finger, that the submaxillary branch is what is felt for the pulse in the horse.

The pulse of a middle-aged horse in health, is generally from forty to forty-five strokes in a minute; when much slower, the horse is labouring under debility; and if greatly increased above forty-five, some inflammatory disorder must be the cause. But it should here be observed, that the pulse of all young animals is quicker than it is as they advance in life, and that, in old age, it gradually decreases in frequency. The arteries of the

horse are seldom diseased, nor are they so liable to ossify as in man.

OF THE VEINS.

One and the principal termination of arteries, is into veins; their extremities commence from those of the arteries; resembling two trees joined together by their extreme branches: they collect the remainder of the blood which the arteries had distributed over the body, and convey it back to the heart, to be prepared for taking a fresh round over the frame. The veins are furnished with valves on their internal surface, which are so constructed as to permit the blood flowing towards the heart, but to prevent its return. These valves are in great abundance, being found at the distance of only an inch, or even in less space, from each other; they are folds of the internal coat of the vein, and are generally to be met with, three together, in the horse.

All the branches of the veins, returning from the different parts of the body, run into two great trunks, called *cavas,* which are inserted into the right auricle of the heart: the anterior cava conveys the blood returning from the head and anterior parts of the animal, whilst the posterior cava

also conveys that returning from all the posterior portion of the creature: both empty their contents, as we before observed, into the right auricle of the heart. Again, the blood distributed over the lungs, is also returned to the heart by eight pulmonary veins in the horse, but only by four in the human subject. These eight trunks are formed from the venous ramifications spread over the lungs, and empty themselves into the left auricle of the heart. The structure of the veins differs from that of the arteries, the former being much more thin in their sides, and having no pulsation; and hence the blood is forced through them principally by the impetus occasioned by the contraction of the heart and arteries, and which is communicated to it while passing through the veins. This, perhaps, is one reason why they are much more numerous in their branches than are the arteries, and also why they anastamose more frequently; for otherwise, the injuries these delicate vessels are liable to in their passage between the muscles, must interrupt the circulation, and be productive of bad consequences. This provision for guarding the circulation of the blood against obstruction, by multiplying the venous communications, is particularly to be seen in the foot of the horse, where the most beautiful net-work is

formed by innumerable branches of veins running nto each other.

OF INFLAMMATION OF THE EXTERNAL JUGULAR VEIN OF THE NECK.

The veins of horses are liable to two diseases; viz. inflammation of the external jugular vein, arising from the operation of bleeding; and a dilatation of the vein on the inside of the hock, which is called blood spavin.

The first disease may arise from several causes; viz. the instrument for bleeding being rusty, or not sufficiently sharp and smooth at the edge; in which case the vein, instead of being clearly cut, is torn: next, the orifice of the wound, not being properly and neatly closed after the operation; and, lastly, not withdrawing the pin in proper time, and which should not be left in longer than forty hours. In either of these cases, inflammation of the vein is apt to take place at the wounded part; a tumour next arises; and if the proper remedies be neglected, suppuration ensues.

Where there is only a swelling, and before suppuration comes on, the application of soap linament will most commonly be found effectual to discuss it; but if suppuration has taken place, it

will be necessary to use the actual cautery, and even to repeat the operation, until the suppurative process be wholly suppressed. And although, by this treatment, the vein is entirely obliterated, yet the circulation will be carried on by the communicating branches.

OF BLOOD SPAVIN.

This disease consists in an enlargement of the vein passing at the inside of the hock, and is caused by the dropsical distention of the mucous capsules, situated at these parts, and which, pressing on the vein, obstructs the passage of the blood flowing through it, and necessarily causes it to swell below the point of compression. It is not attended with apparent pain or lameness, and is to be removed by firing, or applying the following blister *, once or twice, to the enlarged mucous capsule, with a view of exciting the absorption of a part of its contents; when the cause of pressure being removed, the distention of the vein will also disappear.

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* BLISTER.

Spanish flies powdered	1 oz.
Oil of turpentine	6 dr.
Hogs' lard	4 oz.

Mix.

OF THE ABSORBENTS.

Besides the arteries for distributing the blood over all the parts of the body, and the veins which return this fluid back to the heart; there is another set of vessels, called absorbents, from their taking up various substances, and conveying them into the circulation. The absorbents consist of two kinds of vessels; viz. the lacteals and the lymphatics: the former are thin, pellucid vessels, opening every where into the intestinal canal; here they absorb the milky fluid, called chyle, and conveying it onwards through the mesentery into the tube, known by the name of thoracic duct, and in which all these vessels enter; it is thence poured into the circulation through the left jugular vein. To effect this purpose, the lacteals, so called from the milky appearance of the chyle they contain, have a muscular or contractile power, by which they are enabled to drink in the chyle, and propel it onwards; and they are also supplied with valves even more abundantly than are the veins, for preventing the chyle from returning towards the intestines. But what is singular in the lacteals, and which most probably depends on their muscular property, is, that they refuse to absorb all fluids; such, for instance, as the bile, pancreatic juice,

&c.; except the chyle; and which may be plainly seen flowing through these vessels in an animal lately killed.

The lymphatics, so named from the colourless fluid which they contain, comprise the absorbents distributed over all the other parts of the body. These also are pellucid tubes, and convey their contents into the thoracic duct, like the lacteals, but their office differs from that of the latter. The lacteals take up the chyle only; whilst the lymphatic vessels absorb, without exception, all the parts entering into the composition of an animal, as bone, muscle, fat, &c. This absorption is necessary to the health of the animal; for by its means are removed the old, worn-out particles of the frame, and room is made for the deposition of new ones by the arteries: and it is also essential for the removing and carrying away such injured or diseased parts as may be incapable of restoration; and likewise of depositions from inflammations; such as splents, spavins, &c., and which can be made to disappear only by absorption. The lymphatics originate from the surfaces of all the parts composing the body; hence the process of absorption must be as general as that of deposition by the arteries; and as the latter constantly exhale a thin vapour for keeping the surfaces of

the cavities of the body moist and smooth, to prevent their friction; so it is necessary for the lymphatics to be as incessantly employed in absorbing and carrying away that fluid, after it has performed its office; otherwise it must collect in too great abundance, and produce dropsy. Absorption, then, is constant and general in its action, and so much so, that the substances composing the body of an animal now, are not the same that entered into its composition a very few years before; and they also will be changed for fresh substances in a year or two to come. In youth, the deposition by the arteries is greater than the absorption, and hence the young animal grows and increases in size. At the age of twenty-one in man, and about five in horses, the absorption and deposition are nearly equal; but as old age comes on, the action of the absorbents exceeds that of the arteries, and consequently the frame begins to diminish in fulness.

OF THE FARCY.

This disease attacks the superficial lymphatics of the horse; it consists in inflammation and swelling of these vessels, producing tumours between the valves of the lymphatics, and either terminating in schirrosity, or running on to suppu-

ration. In the former case the tumours now become schirrous, are rendered insensible, and may be burnt without exciting pain; and here the disease ends. This affection of the lymphatic vessels seems to depend on the change of temperature, and to consist in simple inflammation; but it is different where the disease proceeds to suppuration. Here the tumours, instead of becoming schirrous, and thereby closing the diseased action, generate a poisonous matter, which shortly infects the whole system: the tumours also burst, and spread into foul ulcers; the membrane lining the nose is soon afterwards attacked, and glanders, with all its symptoms, ensues. Hence suppurative farcy is undoubtedly highly contagious, seeing that it generates a poison productive of glanders; and this is proved by the fact, that if the matter of farcy of one horse be applied to the inside of the nose of another, glanders in this horse will certainly be produced. Is it not probable, then, that this virulent kind of farcy may be very different from the former, depending, like the glanders, (of which it would seem to be a kindred disease, originating perhaps from a common virus, and differing in appearances only from the difference in the parts which it may happen to affect,) on contagion for its propagation? Time and experiments, however, will

be necessary to determine the truth of the supposition; when, if it be proved in the affirmative, whatever remedy may be discovered to prevent or cure the glanders, will also, in great probability, be the specific in preventing or curing this disease.

The present most approved treatment of farcy is to blister or fire the inflamed part, with a view to destroy the diseased action of the vessels: this, if done before suppuration takes place, will frequently succeed; but if suppuration exists, it is to be apprehended that absorption has carried the poisonous matter into the system, and that other parts of the frame will be attacked. Even in this case, the source of the poison should be as much as it is possible destroyed, by first opening the abscesses, and afterwards firing the part, so as to reduce it to the state of a common sore; and at the same time the following mercurial ball should be given to the horse once or twice a day, with a view to render the poison harmless, which might have been absorbed into the system. It should be here observed, that the matter of farcy being, as we have said, productive of glanders, and consequently highly contagious; precautionary measures against its extension should be used with a horse affected with it while under cure; and should

he die in the interim, and the symptoms of glanders not have appeared, yet the same means should be had recourse to for destroying the infection as in this disease*.

OF THE GLANDS.

These are an important part of the animal machine, and vary considerably both in their structure and functions: thus some are small, as the lacteal and lymphatic glands, while there are others considerably larger, such as the liver, kidneys, &c.—The intention of the glands is to separate or form different substances from the blood, either to be continued for some purpose in the frame, or to be ejected from it as useless or noxious. This operation of theirs is termed secretion, and is supposed to be effected, simply, by the blood flowing through these bodies, when only certain parts of it are allowed to pass, according to the diameter of the secerning vessel of the gland; and to the different capacities of these vessels in the various glands of the body, is to be attributed the diffe-

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* MERCURIAL BALL.

Calomel	- -	1 sc.
Powdered aniseeds	-	½ oz.

Syrup enough to form one ball.

rence we find existing in the several substances secreted. The truth, however, of this supposition, though plausible and agreeable to the known simplicity of nature, yet is difficult to be ascertained, owing to the minuteness of the parts of glands, and the subtlety of their action. We can see an artery conveying blood into the body of a gland, and a corresponding vein returning this blood from the gland again into the circulation; and from the same gland we also see an excretory duct discharging a fluid different from the blood. Now, as, besides the artery and vein, no other vessels can be traced belonging to the gland, we are forced to conclude, that the fluid secreted must have been elaborated from the blood brought to the gland by the artery; and also that the secerning process was effected by the peculiar arrangement alone of the arterial branch entering into that body.

This opinion seems to be further justified, by seeing that glands consist principally of a congeries of vessels, which were convoluted perhaps with the view of occupying less room than if they had been stretched out; and also, by observing, that the moisture exhaled on different surfaces of the body, although like other secretions, it is different from the blood, yet is formed by simply

passing through the arterial terminations, called exhaling vessels ; but what astonishes most in the process of secretion is, that such a variety of different fluids as we see in the body can be separated or formed from the blood, which is the source of all : no doubt their elements must have existed in that fluid, or they could not have been elaborated by the secerning vessels ; but how these vessels, by any action of theirs, can separate, strain, and form such different secretions, as the bile, pancreatic-juice, marrow, milk, &c. is truly admirable.

Some glands we have said were small, while others were considerably larger ; each of the small ones consists of an artery, a vein, and an excretory duct, all so convoluted as to form a globular body, connected together, and covered by cellular membrane. The large glands, again, appear to be aggregations of the small ones, and have these peculiarities of structure ; viz. that all the arterial branches conveying the blood to the gland, and afterwards accomplishing secretion, arise from one great trunk, which does not divide till it has reached the body of the gland ; next, that the excretory ducts of the various small glands composing the large one, all run to unite into one great tube, for conveying away the collected secretions of the

small glands; and, lastly, that the branches of the veins, corresponding with those of the artery, all empty their blood into one great trunk, by which it is conveyed back into the circulation. The glands, which secrete only for occasional use, have reservoirs attached to them for containing the secreted fluids, till they may be required to perform their designed functions in the animal machine: but the further description of the glands we shall defer till we come to speak of these bodies individually: and shall now observe on one of their diseases, namely, strangles.

OF THE STRANGLES.

This disease consists in an inflammation and swelling of the glands situated under the jaw: it is most commonly attended with a cough, and sometimes with fever and a discharge from the nose. If even left to itself, the inflammation will soon run on to suppuration; the swoln glands will burst, and discharge the matter they contain, when the other symptoms will generally go off. But with a view to expedite the process by assisting nature, a large poultice kept constantly applied to the inflamed glands, will hurry the cure; and should the horse be feverish, it will be necessary to take away some blood, and to give

the following fever-powder * once a day for a few days: by this treatment the animal will soon recover.

The strangles is sometimes mistaken for glanders; but, as we have observed, when treating of the latter disease, may be easily distinguished by the difference of their symptoms. This disease, however, is supposed by some to terminate at times in glanders; but this does not appear to happen often; and perhaps it more frequently occurs, that instead of strangles having produced glanders in the same horse, the matter of the former disease being taken in at the nose of another horse, and being rendered more virulent by passing through his frame, might ultimately have generated the poisonous disease we term glanders. This also appears to be the case with the matter of the small-pox in man; for if this disease be originally derived, as it is supposed, from the cow-pox, its virulence must have been generated in its long passage through different human bodies.

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* FEVER-POWDER.

Antimonial powder	- -	6 dr.
Camphor	- - -	2 dr.

To be mixed for three doses.

RETROSPECT OF THE CIRCULATION.

The blood containing within it certain vital and nutritive properties; and being, as we have said, that fluid whence all the other parts of the body are formed, and by which their waste and injuries are repaired, requires to be kept in constant circulation all over the frame, otherwise it must be incompetent to the purposes for which it is intended. With this view it is provided with the organs of circulation, consisting, as we have seen, of the heart, arteries, veins, and absorbent vessels, and which are incessantly employed in carrying the blood through the following course:—First, the chyle, or nutritive fluid, which is formed by digestion from the food being conveyed from the intestines by the lacteal vessels, is poured into the circulation at the left jugular vein; here mixing with the venous blood, both are carried to the right side of the heart, when entering the auricle as a sort of reservoir, it is forced into the ventricle of the same side, which also contracting, the blood is propelled into the vessels of the lungs, there to receive certain properties from the air, as shall be hereafter explained. The blood being now considerably changed in the lungs, is returned to the left side of the heart, where, filling the auricle of

that side, it is further forced into the left ventricle, and from it propelled into the aorta: hence the heart propels the blood into two different circulations; the one over the lungs, and the other through the rest of the body. The aorta, partaking of the contractile nature of the heart, propagates the propulsion along its numerous branches, by which the blood is conveyed to the remotest parts of the frame, where, having yielded life and nourishment, the remainder of this fluid is collected by the veins, and returned back to the right side of the heart, to receive fresh supplies of nutritive and vital properties, and be again fitted for repeating its former course, and to complete the circle in which the fluids of the animal body move. The absorbents take up all such exhalations on the internal surfaces of the different parts of the frame, as the arteries may have exuded, and return them, as we have said, again into the circulation.

We shall now pass to the description of the respiratory organs, and which constitute an important part in the economy of the horse.

OF THE

ORGANS OF RESPIRATION.

THE function which these organs accomplish is a very principal one in all animals, being that on which their life immediately depends. In the circulation of the blood we saw a provision for recruiting and repairing the waste and injuries of the constantly wearing machine, by supplying it instantly with fresh nutritive matter, formed from the food which the animal takes in; but in breathing we behold that process which is essential to animate the whole of the frame, and invigorate its various actions, and without which death must, in a few minutes, take place. We shall first describe the organs of respiration, and afterwards speak of this important and noble function.

OF THE TRACHEA; OR, WIND-PIPE.

This tube for conveying the air into the lungs communicates in the horse with the nostrils principally; the passage between it and the

mouth being almost completely shut up by the epiglottis and velum palati; so that this animal scarcely ever breathes through his mouth. The upper part of the wind-pipe is termed larynx; it consists of thin cartilaginous plates connected together by ligaments, and put into motion by small muscles for producing the sounds expressed by the animal: these cartilages form a sort of chamber at the head of the pipe, and have a valve defending the opening into them at the upper part. The remainder of the air-tube leading from the larynx down into the lungs, is composed partly of cartilaginous rings, and in part of a strong elastic membrane: the rings are intended to keep the passage constantly open for the free admission of the air; but they do not describe a circle, the back-part of the wind-pipe being composed almost wholly of the elastic membrane for the greater accommodation in the act of swallowing. This membrane also connects the cartilaginous rings together, and thus completes the sides of the tube. The wind-pipe is lined on its internal surface with a membrane which incessantly secretes a mucus for keeping its surface moist, and thereby defending it from the air passing to and from the lungs. This

membrane is very liable to be diseased in recent colds, and is the seat of what is termed roaring.

OF ROARING.

Horses taken from grass or camp, and put into stables comparatively hot, are extremely liable to inflammation of different parts, from the sudden and great change of temperature; and, among the rest, to inflammation of the lining membrane of the wind-pipe, a little below the larynx. When this inflammation is not resolved in time, by blistering and using the other remedies necessary in inflammatory affections, coagulable lymph is at length thrown out by the vessels of the part, and in such quantities as to form transverse bands, which cross the diameter of the wind-pipe, and, consequently, resisting the air in its passage, produce the disagreeable noise termed roaring.

OF CATARRH; OR, COLD.

This disease consists, as we have said, in an inflammation of the membrane lining the wind-pipe, and is attended with a cough, discharge at the nostrils, and frequently some fever.

It will be necessary at first to bleed moderately,

with the view of keeping down the fever; also give warm bran mashes; blister the throat, keep the horse warmly clad, and give the following fever powder* once a day till the horse gets better.

OF CHRONIC COUGH.

When recent colds are improperly treated, or neglected, a constant and tiresome cough is apt to be the consequence, which greatly distresses the animal, and remains for a considerable time after the inflammatory affection has subsided.

To remove it, first blister the throat, keep the horse moderately warm, give him regular exercise, and the following ball †, once each day, till the horse begins to recover.

OF THE LUNGS.

These are two spongy bodies which occupy the principal part of the cavity of the chest: they

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* FEVER POWDER.

Antimonial powder	3 dr.
Camphor	1 dr.

To be mixed for one dose.

† BALL.

Tartarised antimony	$1\frac{1}{2}$ dr.
Aloes, Barbadoes	$1\frac{1}{2}$ dr.
Castile soap	$1\frac{1}{2}$ dr.

Syrup to form one ball.

are separated from each other by the mediastinum extending from the breast-bone towards the spine of the back, and which consequently divides the cavity of the chest into two lesser ones, each containing a lung; so that if one should be injured, the other lung might be enabled to perform its function without interruption. This division is formed by the junction of the pleura, which is a membrane lining the chest, for the purposes of defending the delicate surfaces of the lungs from the ribs, and also to keep them moist, and thereby prevent injury from friction in their incessant motions: the mediastinum separates at the posterior part, for lodging the heart and pericardium; and it also forms a passage for the great blood-vessels running near the spine.

The lungs consist principally of air-vessels, blood-vessels, and cellular membrane. The first are continuations of the air-tube, which, after having entered the chest, divide into two trunks, to be ramified one throughout each lung: these vessels terminate in innumerable small cells. The blood-vessels are the ramifications of the pulmonary artery and veins already mentioned; whilst the cellular membrane is intended to unite and connect all these parts together, and form them into a regular compact whole. The lungs are of themselves per-

fectly inactive, till forced into respiration by the action of the diaphragm, intercostal and abdominal muscles, as shall be explained when we come to speak of that operation. We shall now observe on their diseases.

OF INFLAMMATION OF THE LUNGS.

This disease is extremely violent in the horse, frequently terminating in mortification and death in a very few days: this rapidity to destruction is the case in all inflammatory affections in the horse, and is occasioned by the great muscular power of his heart and arteries, and which hurries the inflammation on to a speedy and fatal termination. Inflammation of the lungs, like that of most other parts in the horse, is generally caused by too sudden a change of temperature from a cold to a comparatively hot situation; and thus horses brought from grass, the straw-yard, or camp, into close stables, are particularly liable to this disease. The symptoms are as follow; viz. the horse's pulse increased, but oppressed; his respiration quicker than usual; his breath hot; tongue dry; the flanks heaving; his ears and extremities feel cold; the horse hangs his head; his eyes are dull, and he never lies down.

If the disease has continued for four days, and the proper remedies have been neglected, death will, most probably, ensue; and, on dissection, the lungs will be found of a dark livid colour, and in a state of gangrene.

The remedies to counteract this violent disease should therefore be promptly used on the first discovery of the inflammation; they should also be of the most powerful kind for lessening the determination of the blood to the inflamed parts. Thus, first, the horse should be copiously bled from a large orifice, to the amount of four, five, or six quarts, with a view of lessening the distention of the vessels, and also the pressure of the blood against the sides of the anterior cava and right auricle of the heart, and which, in this disease, are sometimes found burst, owing to the passage of the blood from these parts into the lungs being obstructed by the inflammation going on in these organs. The pulse, which were before oppressed, will now rise and become more full as the distention of the vessels abates with the flowing of the blood; but after the removal of a certain quantity of this fluid, the pulse will gradually become weak: give a pint of castor oil; and if the animal be costive, throw up a clyster of warm water. The sides of the chest covering the lungs

should be blistered, to make a counter-determination of the blood from these organs; and a rowel or two ought to be introduced under the chest and abdomen: and the more effectually to relieve the lungs, by creating artificial inflammation in other parts, the animal's legs should be stimulated, by being well rubbed with spirits of turpentine. Tartar emetic and opium, of each a drachm, may also be given internally, to help to determine the blood to the surface of the body; and to assist this operation of the medicines, the animal should be warmly cloathed; but, at the same time, the air of the stable ought to be preserved fresh and cool. The medicines should not be discontinued immediately after the horse begins to recover, but may be gradually lessened in quantity, till he regains strength, and is able to feed nearly as before. If, however, the opium induces costiveness, it should either be lessened in quantity, or omitted altogether, and an occasional clyster should be administered.

It should here be observed, that purgatives must not be given in inflammation of the lungs, as, inducing a greater flow of blood to these organs, they must necessarily tend to aggravate the disease; but this is not the case with diuretic medicines, which, on the contrary, are rather salutary.

OF THICK WIND.

This disease is a consequence of the former one, or inflammation of the lungs. It consists in a deposition of coagulable lymph in the cells of the lungs; and which, by lessening the capacity of these organs for receiving air, necessarily causes the animal's respiration to be quickened. Medicines have been given with the view of creating the absorption of this lymph filling up the air-cells, but generally without effect.

OF BROKEN WIND.

A horse labouring under great difficulty of breathing, with heaving flanks, and his expiration being much slower than inspiration, is said, and not inaptly, to be broken-winded. For this disease really consists in a rupture of the air-cells of the lungs; by which the air received into these organs in inspiration, insinuates itself through the ruptured cellular membrane, and, consequently, requires a greater length of time for effecting its expulsion: and hence the inspiration of a broken-winded horse is accomplished in one third of the time occupied in expiration, which particularly distinguishes this disease from the former one.

The rupture of the air-cells of the lungs caus-

ing broken-wind is most generally occasioned by violently exercising a horse on a full stomach: for now the lungs not being permitted to expand sufficiently backwards, owing to the distention of the stomach; and the animal's respiration being necessarily quickened with the exercise; the quantity of air which he is obliged to inspire being too great for the capacity of the lungs to receive, causes a rupture of the cells. Hence, from seeing the cause of broken-wind; it should be observed as a rule never to exercise a horse too soon and violently after feeding, and particularly if the animal has eaten heartily. A horse, as will be hereafter seen, has a comparatively small stomach, and therefore should be fed often, and with only an apportioned quantity at each time: but when he is forced to fast for any considerable time, and then allowed to eat at pleasure, he generally feeds voraciously, so as to over-distend his stomach; when, if he be smartly exercised, it is extremely probable that broken-wind will be the consequence. From the nature of this disease a cure is not to be expected: and all that can be done is, by regulating the animal's diet, to moderate the inconveniences of the disease: thus to prevent pressure against the lungs, and which must increase the difficulty of breathing, the

horse's stomach should be preserved from over distention as much as possible: this is to be effected by giving the horse but little hay or water at a time, and feeding him with nourishing substances which occupy but a small space; such as corn, carrots, beans, &c., and he should be worked generally on an empty stomach.

OF RESPIRATION.

This noble function, necessary to invigorate all the movements of an animal, and on which life itself immediately depends, consists in the horse, as in man, of inspiration, or the ingress of air into the lungs; and of expiration, or the expulsion of the air from the lungs: it begins soon after birth, and continues, without intermission, during the life of the creature; and it is thus performed:

The diaphragm, or muscle dividing the chest from the abdomen, being contracted, is reduced from a convex to a flat surface; and the lately convex side being next to the lungs, the cavity of the chest is necessarily enlarged at this part; whilst it is also increased at the sides by the expansion of the ribs, and which is effected by the contraction of the intercostal muscles. The chest being now widened in all directions, the lungs follow the receding sides, when the air they contain being expanded by its elasticity, the external air

rushes in to restore the balance. Inspiration is now completed, when the following process takes place for its expulsion:

The belly of the horse being protruded by the act of inspiration, the abdominal muscles are excited to re-act, their powerful contraction pushes forward the now relaxed diaphragm into the chest, and being attached to the posterior edges of the ribs, they pull them backwards with great force, and consequently diminish the cavity of the chest: this induces compression of the lungs, and the air they contain is necessarily forced out, which act constitutes expiration.

Respiration is essential to all animals, and is performed in the manner above described in the horse, and in all creatures having a diaphragm; but in insects and fishes, although they also respire, yet the operation of breathing is effected by a different apparatus. The uses of breathing are—for the blood in the lungs to absorb, from the inspired air, certain properties which are necessary to the continuance of life, and, at the same time, to get rid of other properties, which are known to be destructive of life, and which, therefore, must be injurious, if allowed to remain in the animal. That the atmospheric air does impart certain properties to the blood in breathing, is proved, first,

by this fluid becoming, from a dark purple, a bright red colour, and also by examining the air remaining, after the creature has ceased to respire. Thus an animal, placed under a glass vessel, in which there is an apparatus for carrying off the carbonic acid, or fixed air, as fast as it is generated, will live only so long as any portion of the vital constituent of the air within the glass remains; this being all consumed by him, and no fresh supplies being admitted, he immediately dies. Now the air remaining in the glass vessel being carefully examined, it will be found to be considerably changed; it will be less in quantity, and it will no longer be possessed of the properties it contained before the animal was placed in it. If another creature be confined to it for respiration, he will die, as did the former one; and a burning body, dipped into it, will be immediately extinguished; hence it will no longer be fit either for respiration or combustion, and it is therefore termed the azotic portion of the air. The other part of the air, or that imbibed by the blood of the animal respiring it, on the contrary, is what sustains both combustion and respiration; for if a proper quantity of this constituent of the atmospheric air, be mixed with the former azotic portion, a combustible body will burn, and an animal

live in it as before. This respirable part of the air is termed oxygen, from the property which it possesses of converting different substances into acids.

The carbonic acid, or fixed air, which an animal expires, is somewhat more in quantity than the oxygen he has absorbed: on examining this exhaled fluid, it will be found to be totally unfit for supporting life, killing, almost immediately, such animals as are exposed to it.

We have now sketched the nature of breathing, together with the changes which the atmospheric air undergoes by this operation, with the view of impressing the necessity of constantly preserving to the horse a sufficient supply of fresh, wholesome air, as the best means of preventing diseases, and keeping the animal in full health and spirits.

OF

ANIMAL HEAT.

THE production of heat is a result arising from respiration; and, from the erroneous and detrimental opinions entertained concerning it, deserves to be noticed in this place. Heat, to a certain degree, is essential to the continuance of the vital movements; and hence it is to be found in all living creatures: it is evolved from that portion of the air which is absorbed by the blood of the animal in breathing, and is diffused throughout the frame by that fluid circulating to all its parts. Thus heat is generated within the horse from the air he breathes; and, in this instance, respiration very much resembles combustion; for both these operations principally consist in the decomposition of that oxygenous or vital portion of the atmospheric air, during which heat, one of its component parts, is evolved.

From this view of the source of heat, it will be seen, that a constant breathing of pure atmospheric

air is absolutely necessary to enable an animal to keep up a sufficient supply of heat in his system; and that where the source of this genial property is narrowed and impaired by the closeness of situations which do not permit the entrance of constant and fresh supplies of air, the heat of the animal must be diminished in quantity, and langour and debility will succeed. This, however, is but seldom the case, rarely occurring except on board ships, where, during bad weather, the hatches are obliged to be fastened down, and the access of a sufficient quantity of fresh air to the horses in the hold is necessarily precluded. And it more frequently happens that stables are so constructed as to admit a sufficiency of air for the generation of heat, but not for the removal of this heat afterwards, and which is the cause of many of the inflammatory diseases affecting the horse.

A DUE TEMPERATURE NECESSARY TO THE ANIMAL'S HEALTH.

As the heat is constantly generated in an animal, so is it as incessantly passing off; and a due medium between these two operations constitutes the temperature of the creature, and serves as a standard for judging its health. But that the escape of heat may not be too rapid and great

under various circumstances, nature has guarded animals with coverings, which, by permitting the heat to pass off but slowly, retains a sufficiency in the creature, till fresh heat is generated. Thus, birds are covered with feathers and down, and quadrupeds with hair; all which being slow conductors of heat, keep the animals to which they belong sufficiently warm. For this purpose the horse is furnished with hair; but as this is not thought a sufficient defence against the rigours of our winters, clothes round the body are also added: this custom is certainly necessary for horses of the blood kind, which, being descended originally from a stock inhabiting a warm climate, are protected by thinner coverings than are those of the heavy, draught breed. But the clothing of a horse should be regulated as well as the temperature of the stable he inhabits, and for the same reason, namely, to preserve the animal a sufficiency, but not more, of the heat he generates.

SWEATING, A COOLING AND SALUTARY PROCESS.

A horse under exercise has his heat greatly increased; at this time, also, his breathing is much accelerated, as was observed when speaking on muscular motion; and the cause of both being

continued, the excess of heat must at length become intolerable, if not passed off equally rapidly with its increased generation. For this purpose nature has contrived the refrigerating process of sweating; which, by the formation of vapour, carries off a greater quantity of heat than could be done merely by the surrounding air, and thus preserves the equal temperature of the horse. Care, however, should be taken, that, while this cooling process is going on, the horse be properly treated, otherwise a cold and inflammation may be the consequence. To prevent this, he should be gradually cooled, and not suddenly plunged into cold water, as is often done; nor let to remain stationary in an exposed place: on the contrary, a horse, after sweating exercise, should be gently walked, and afterwards clothed, and allowed to continue thus protected until the perspiratory action is found to have ceased, and the body is become dry; he should then be dressed; when the vessels of the skin being restored to their former action, no bad consequences will ensue.

OF INFLAMMATION.

But if, on the other hand, the horse fall under improper management; if, while profusely sweating, and fatigued from great exercise, he is kept

exposed and motionless to a cold, cutting air, or is plunged, in that state, into cold water, a general constriction of the vessels of the surface of the animal's body will take place, the outlet for the passing off a sufficiency of the generated heat is closed, and the accumulation of that active stimulus, exciting an increased action of the heart and arteries, a general inflammation* will succeed; or, as is often the case, the inflammatory affection will seize upon some particular organ or part, and constitute one of the different diseases described in the course of this work.

This view of the cause of general inflammation or fever, will also explain how the accumulation of heat, in hot, confined stables, or the sudden transition of a horse from the cool, open air at camp or grass, into close, crowded, or warm stables, will also cause the numerous inflammatory affections which we see attacking horses in these situations; for by the too great accumulation of heat, or sudden exposure to it, an excessive stimulus is, in fact, applied to the heart and arteries of the animal; and the consequence is, an increased action of these irritable organs, by which the circulation and respiration are increased, and the heat still more rapidly generated.

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* Vide page 207, under the head "Fever."

Plethora and high feeding, without sufficient exercise, may also be explained on this principle, as inducing inflammatory disorders; for they both tend to increase the stimulating property of heat.

Injuries, as blows, wounds, &c. also excite inflammation, first in the affected part, and afterwards not uncommonly of the whole of the animal's frame. In this case, the general inflammation, or fever, is termed symptomatic; as it also is when arising from the prior inflammation of any of the organs or parts of the body, which may become affected without any apparent cause.

Inflammation terminates four ways; viz. first, by resolution; that is, where the inflammatory action soon subsides, without leaving any diseased consequence; secondly, into suppuration, or abscess; thirdly, in effusion, where blood, lymph, or serum, are effused; and, fourthly, in gangrene, or mortification.

The cure of inflammation of the external parts, and also of the internal organs, being treated of in their respective articles, we shall here only describe mortification, and the treatment that should be had recourse to in order to stop its progress, and save the animal.

GANGRENE.

The most dangerous result of inflammation, is gangrene, or mortification, which implies the death of the part; and frequently, by extending, kills the animal. It ensues in consequence of the excessive action of the vessels of the affected part, from violent injuries, or deep and torn wounds; and hence arises the necessity of abating and keeping down the inflammatory action in these cases, by early bleeding, and forwarding suppuration by the timely and continued use of warm poultices.

When gangrene has commenced, the matter discharged from the wounded or injured part, is dark, thin, and extremely offensive, instead of being a healthy, white, and thick fluid; the pulse also becomes weak, quick, and often irregular, and the animal grows very weak. In this state, there is much danger of losing the animal, except the most speedy means are had recourse to for preventing it. First, the wound should be dressed with oil of turpentine, or camphorated spirits of wine; the diseased parts should then be scarified, and afterwards fomented continually, until the gangrened parts begin to separate, and the sore acquires a more healthy appearance, by losing its

offensiveness of smell, assuming a more red colour, and discharging a whiter and thicker matter. The animal should also be supported by a nourishing diet, and the following cordial ball * be given to him once a day, till he recovers his appetite and strength.

OF FEVER.

When inflammation becomes general, increasing the action of the whole vascular system, it is denominated fever; which also is further distinguished into primary or simple fever, and symptomatic fever, or general inflammation, arising, as we have said, from the prior affection of some particular organ or part.

This last division of fever is treated on in the description of the diseases whence it arises; but primary, or simple fever, requires to be described here.

In this disease, the symptoms are, shivering, loss of appetite, dejection, quick pulse, breath hot,

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* CORDIAL BALL.

Peruvian bark	1 oz.
Ginger	½ dr.
Opium	½ dr.

Syrup to make one ball.

slight debility, and partial costiveness, with difficulty of staling.

Cure.—The horse should be bled; a pint of castor oil ought to be given, to remove costiveness; a rowel, placed under the chest, will be serviceable; at the same time keeping the animal moderately warm, and giving him warm bran mashes, instead of corn. He should also have the following fever powder* administered to him once or twice a day, till he begins to recover his strength and appetite.

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* FEVER POWDER.

Camphor	1 dr.
Antimonial powder	$2\frac{1}{2}$ dr.

Mix for one dose.

OF THE

ORGANS OF DIGESTION.

THE constant waste of the animal machine being replaced by the blood, this fluid is necessarily incessantly diminishing, and requires itself to be replenished with new supplies: these supplies are furnished from the food which the animal takes in; but to fit it for the purpose of being assimilated with the blood, certain changes are necessary to be effected; and, with this view, the digestive organs are given: they consist, in the horse, principally of the gullet and stomach, the intestines, liver, spleen, and pancreas; and which we shall now proceed to describe individually.

OF THE ŒSOPHAGUS, OR GULLET.

The food being broken down in the mouth by the teeth, and converted into a pulp by the admixture of the saliva exuded from the inside of the cheeks, is conveyed into the stomach by means of a membraneous tube, reaching from the back of

the mouth down to that organ. This tube, called œsophagus, has a muscular coat, which enables it to contract powerfully on the food, and thus force it downwards: it is lined on the inside with an insensible membrane, which is well calculated to preserve the gullet from being irritated and inflamed by the different substances passing down through it; and hence it is never found inflamed in the horse.

OF THE STOMACH.

This is a bag, or pouch, just behind the diaphragm, at the termination of the gullet, and is intended to receive the food as it descends through the latter, for the purposes of digestion. With this view, it is furnished with muscular fibres, which, by their contraction, enable it to compress the food, and further break down its texture: but what principally promotes the digestive power of the stomach is, the gastric juice, which is exuded from the internal surface of that organ, and which is of so dissolvent a nature, as to destroy the coats even of the stomach itself in a few hours after the death of the animal. This juice, being mingled with the newly-received food by the movements of the stomach, quickly reduces its pulpy contents to a thinner condition; and it is probable, that, to protect the stomach

from the dissolvent effects of the gastric juice, another fluid, corresponding with the oily secretion of the eye, for defending this delicate organ against the acrimony of the tears, is also furnished during the life of the creature; but which ceasing to flow after death has ensued, allows the gastric juice to exert its full force upon the now unprotected stomach, so as totally to destroy some part of this organ.

One half only of the stomach of the horse secretes the gastric juice; the other portion of that organ being lined, as in the rat, with a continuation of the insensible membrane covering the inside of the gullet; and hence it in great part arises why different powerful medicines have but little effect on the horse; for more than half of the animal's stomach being insensible to stimuli, their force is necessarily limited with the part on which they can operate: thus of blue vitriol, or calomel, a drachm may each day, for some time, be given without injuring the stomach; and arsenic, which acts as a violent poison in the human subject, can be administered with safety to the horse, in the quantity of a drachm in twenty-four hours. Mercury also requires to be given in very large doses before it affects the stomach of the horse; and some medicines, such as jalap and Glauber's salt,

and which are known to have an effect upon the human subject even in moderate doses, produce scarcely any sensible change in the horse, although administered, the latter in nearly the quantity of a pound, and the former to the weight of four or five ounces. Further, tartar emetic may be given in the large proportion of two drachms twice a day without injury; and even this dose may be considerably increased without exciting vomiting; but this last circumstance depends more perhaps on a valvular structure at the lower extremity of the gullet, just as it enters the stomach, and which serves to prevent the food returning into that tube, than it does on the insensibility of a portion of the stomach.

The horse's stomach is small compared with those of the ox and sheep; and it is, in some cases, not much larger than in man. This, most probably, is the reason why the horse continues constantly eating; for his stomach being small, he is able to lay by no great store of food at a time, and he is under the necessity of more frequently filling it; and from this economy of his stomach, we should be convinced of the propriety of giving the horse but moderate quantities of food and frequently, rather than making long intervals between his meals, and then permitting him to eat

voraciously; and which, in this case, he never, in health, fails to do. The great evil of this treatment consists in the over-distention of the animal's stomach, and which not only unfits him for immediate exercise, exposes him to become broken-winded, and suspends, for a time, the digestive power of that organ, but also makes it liable to be ruptured by the swelling of its disproportioned contents, when almost immediate death is the consequence.

RUPTURE OF THE STOMACH.

Instances of this sort more frequently occur than it is imagined; and the writer of these pages has witnessed three cases, where sudden death was the consequence of the horse's stomach being burst by the swelling of the food it contained.

In the first case, the horse got loose in the night, and finding corn in a bag in one corner of the stable, ate a large quantity of it, and soon after expired. On dissection, the stomach was found burst, having a rent of some inches in length, whilst a great portion of the oats the animal had received into his stomach lay outside this organ, in the cavity of the abdomen, with many of the grains scarcely broken, and much swelled with the moisture they had imbibed. And from the infor-

mation collected concerning the causes of the other two cases of immediate death, owing to the rupture of the stomach, it appeared that the horses had also eaten too voraciously. But it should here be observed, that, in all the three cases, the horses thus dying were old, when perhaps the fibres constituting the coats of the stomach having lost a great portion of their elasticity through age, this organ was no longer able to expand sufficiently with the swelling corn it contained, and a rupture of its sides was necessarily the consequence. Hencé it is probable, that a bursting of the stomach is not a frequent occurrence with young horses, whose stomachs, from being less rigid in their fibres, are capable of being accommodated to the size of their contents.

OF BOTTS.

The stomach of the horse, from being partly insensible, is therefore incapable of sympathizing with the other parts of the frame, as in the human subject; and, for the same reason, it is seldom liable to disease. It is, however, sometimes disordered by an accumulation of worms, termed botts, which fasten on the insensible membrane lining the stomach by two dense, sharp hooks, and which cannot be destroyed by the operation of medicines,

although at times they will detach themselves spontaneously.

These worms are hatched by the warmth of the stomach, from eggs deposited by the horse-fly in the summer season, and which the horse, in biting his hair, on which these eggs are laid, licks up and swallows. They are to be found in most horses, and particularly at a certain time of the year, and in general are not hurtful; but they sometimes increase greatly in number, and, insinuating themselves between the coats of the stomach, greatly indispose this organ, and prevent the horse from thriving. In this case little can be effected by medicines; but the following aloetic purge will succeed in detaching such of these insects as are already nearly loosened from the stomach*.

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* PURGE.

Aloes (Barbadoes)	6 dr.
Powdered ginger	1 dr.

Syrup to form one ball.

OF THE

INTESTINES.

FROM the right orifice of the stomach arises a long membraneous canal, which, after making many windings, and filling up a great share of the cavity of the abdomen, terminates at the anus. Its structure resembles the sensible portion of the stomach, being composed of muscular and vascular parts: the vessels enable it to secrete a mucus on its internal surface, for keeping it moist, and assisting the digestion of the food; whilst the muscular fibres, constituting one of the coats of the intestines, effect, by their powerful contraction, the vermicular motion of these organs for forcing the food onwards.

The intestines are generally described as if consisting of detached parts, whereas they are all but one tube, continued from the stomach, and ending at the extremity of the body. Hence it should be recollected, that the distinctions creating the different names, arise simply from the variety of the

size or figure of the part, and not from any separation between the different portions of the intestinal canal. Thus, the first part of the intestines arising from the right orifice of the stomach is termed duodenum: it quickly receives the food from that organ; for the stomach of the horse contributes not much to the digestive process, which is mostly carried on, in this animal, in his intestines. The duodenum, a little after it leaves the stomach, has two openings through its coats, by which it receives the bile and pancreatic juice, for mingling with the food and promoting digestion. From the duodenum is continued the jejunum, and from the latter, the ileum. These three portions constitute the small intestines, and are about twenty-six yards in length in a common sized horse: they are full of the mouths of the lacteal vessels already described, for taking up the aliment and conveying it into the circulation. At the termination of the ileum, or small intestines, is situated the cœcum, which resembles a bag, or pouch, and seems intended to receive a portion of the food, and retard its progress onwards, till the whole of its nutriment be extracted; but the greater quantity of the food is passed directly from the ileum into the colon, or second large intestine, without entering the cœcum. There is a valvular

structure between the ileum and colon, which admits the passage of fluids into the latter, but prevents their regurgitation backwards into the small intestines. The colon is drawn up into several sacs or purses by two ligaments, one of which runs at the upper, and the other along the under side of this portion of the intestines. These partial foldings of the coats of the gut, by forming depressions, greatly retard the progress of the food, until most of the nutriment it contains is absorbed by the lacteals; and a little before the colon terminates, its diameter is greatly lessened, for still further delaying the food for the above purpose. At this place, also, the colon makes a curvature; and digestion being here completed, the feculent remains are forced into the last portion of the intestines, termed the rectum, and are, by the muscular strength of this gut, finally eliminated from the animal. It should be here observed, that the danger of giving strong purgative medicines to horses, is greatly increased by the narrowing of the colon at its curvature; for then the irritation and pressure against this part of the gut being greatly aggravated, inflammation and mortification are often the consequence.

The intestines, together with the stomach, are enclosed in the peritoneum, which is a membrane

that lines the sides of the abdomen, and is also reflected over the most of its contents. It encloses the guts within it, as an arm is enclosed in a sling; and being itself attached near to the spine, sustains the intestines in their general situation, but allows the different portions of that tube sufficient freedom for all their motions. This membrane is also the medium through which the different blood-vessels and the lacteals pass to and from the intestines; and, from its constantly exuding a fine, lubricating fluid every where from its surface, it is particularly well adapted to keep the intestines moist, and, by that means, prevent the bad consequences of friction in their various movements.

OF EXCESSIVE PURGING.

The intestines are liable to be excited into an excessive action by the exhibition of too great a quantity of purgative medicine, when constant purging, inflammation, and death, are often the consequence. This more frequently is the case than is admitted or known; for practitioners, who are in the habit of giving large doses of purging medicines to horses, either do not know the danger of such practice, or will not admit it; and after the death of the patient, some other cause than the right one is sure to be assigned for the destruction

of the animal. Between four and seven drachms of aloes ought to be the dose for purging a horse; and, if it be necessary to repeat the dose, several days should intervene, lest the effect be rendered too severe. The animal's drink should not be given to him cold, during the operation of the medicine; and his body ought to be clothed, and the stable in which he stands kept moderately warm. With this treatment no danger can accrue, and in a very few days the horse will be fit for work.

But if, on the contrary, a large dose of purging medicine be administered, or a proper treatment not observed during the operation of the medicine, and that excessive purging, with inflammation, have taken place, recourse must be immediately had to the following treatment:—First, then, the horse should be kept warm; and, with the view of removing the irritation with the cause of the disease, starch clysters should be used: by these the inflamed intestine will be fomented, and the remaining aloes washed away; nor ought astringent medicines to be exhibited till this effect be produced. Opium may now be administered in the quantity of half a drachm twice a day; and, at the same time, it should be endeavoured to determine the blood as much as possible to the surface of the body: this is to be effected by employing embracations

of oil of turpentine, by blisters, and even by firing: the animal's extremities, also, should be frequently well rubbed, and his body kept warmly clothed: —and further; the horse should be allowed to remain at perfect rest, lest the action of his intestines may be increased by exercise, and the disease consequently be aggravated. With this treatment the animal may be saved; but it more frequently happens, that either the proper remedies are not employed sufficiently in time, or the inflammation has gone on so rapidly, that mortification and death speedily take place, notwithstanding all the fit means for preventing them were used.

It should be observed, that, in this disease, the cœcum and colon are most generally the seat of inflammation, which, at first, is confined to the mucous membrane of these intestines, but afterwards extends to their muscular and even peritoneal coats.

OF INFLAMMATION OF THE INTESTINES.

The intestines are subject to inflammation, independent of purging. In this case the muscular and peritoneal coats are the seat of the disease, and the horse exhibits the following symptoms: He endeavours to strike his belly, from pain; lies down; rolls upon his back; gets up suddenly;

lies down again, rolls; and frequently repeats these movements. His pulse is hard and frequent, being as high as from eighty to one hundred strokes in a minute, and his limbs and ears generally feel cold.

As this is a very dangerous disease, running on speedily to mortification and death, the most powerful remedies should be used with the greatest dispatch. The horse should be immediately bled to the quantity of six or seven quarts, it being of more service, in inflammatory disorders, to take away a large quantity at first, than to draw even more from the system by repeated bleeding afterwards. His sides and belly should be stimulated by the application of turpentine, by blisters and firing; and his extremities ought also to be constantly rubbed, with a view of effecting a derivation of the blood from the inflamed intestines. Warm cloathing should by no means be neglected; and his food should consist simply of water-gruel, which may be given frequently, so as to have the effect of fomenting the diseased part.

In this disease medicines given internally would only aggravate its symptoms; it is better, therefore, not to employ any, and to trust wholly to the above treatment, together with successive clysters, consisting of large quantities of warm

water only, and which being frequently thrown into the intestinal canal, tend greatly to abate the violence of the inflammation.

Care should be taken that this disease be not mistaken for gripes or spasms of the intestines, as the medicines good for the latter, would be absolute poison in the former complaint, and could not fail speedily killing the animal. There are two distinguishing marks for discriminating between these diseases, and which should be carefully noticed before the practitioner proceeds to administer his remedies. The first is, that in inflammation of the intestines the horse, after rolling on his back, speedily gets up again; whereas in spasms, he endeavours to remain lying on his back for some time. And the second difference is in the state of the pulse, which, as we have said, is hard and frequent in the inflammation of the intestines; but in the disease termed spasms, is more soft, and less frequent.

OF SPASMS OF THE INTESTINES.

This disease is frequent in the horse, arising most commonly from permitting the animal, while hot, to drink large quantities of cold water: it is known by the name of gripes, and consists of partial contractions of the muscular coat of the small

intestines, seldom happening in the large ones, and by which the diameter of the affected intestine is lessened one half. The symptoms of spasms are as follow: the horse frequently lies down, rolls upon his back as in inflammation of the intestines; but endeavours, in spasms, to continue in this posture; then rises, and, after running a short distance, again lies down, and rolls upon his back as before. He also strikes his belly, and appears in great agony; but his pulse is neither so hard nor frequent as in inflammation of the bowels.

Spasms are sometimes cured by hard riding the animal; but what has been found a specific, and never known to have failed of success, in curing this disease, when employed in sufficient quantity, and in time, is turpentine. On ascertaining therefore the existence of spasms of the intestines, the following drench * should immediately be given to the horse; the dose to be repeated in four hours afterwards, if the symptoms have not abated.

In general this treatment will be sufficient to relieve the animal; but should the spasms be particularly violent, besides exhibiting the turpentine

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* DRENCH.

Oil of turpentine	4 oz.
Water-gruel	1 pint

Mixed for one dose.

internally, the horse's belly should be stimulated by rubbing it with spirits of turpentine for some time: clysters ought also to be had recourse to; and as from the continuance of the spasms inflammation may have taken place, a small quantity of blood should be taken away. Laudanum is found serviceable in this disease.

OF THE

LIVER.

THIS organ, whose use it is to secrete the bile, occupies in the horse a considerable space just behind the diaphragm. It lies principally at the right side, but also extends into the left side of the abdomen, and is retained in its situation by ligamentous bands, which pass from this organ to the contiguous parts, and fix it firmly to them. The liver is of a dusky red colour, and is the largest gland in the body: its consistence is soft, being composed chiefly of vessels and cellular membrane; and it exhibits the following variety in the circulation of the blood.

Contrary to the general law of the circulation, the bile in the liver is secreted, not from arterial but venous blood: for this purpose, the blood returning from the different viscera of the abdomen, except the kidnies, is conveyed by veins towards the liver: here these vessels unite into one great trunk called the vena porta, which soon

afterwards enters this organ, and spreads its branches over its substance. Some of these branches terminate in the biliary ducts, through which the bile exudes; while the rest run into the hepatic veins, which convey the blood remaining after the bile has been secreted, back into the circulation by numerous branches going to the posterior cava. Thus the vena porta, although in reality a vein, performs the office of an artery in supplying the liver with blood for the formation from it of the bile; and at the same time the liver is itself furnished with the hepatic artery, which conveys to it arterial blood for its own nourishment, and the repairing its waste.

The bile, after being separated in the liver from the mass of blood brought to this organ by the vena porta, is conveyed by the biliary ducts into one tube named the hepatic duct, which enters the duodenum, or first portion of the small intestines, a few inches from the stomach: here the bile is constantly passing into the intestines, to mix with the food, by an opening common to it and the pancreatic duct; for there being no gall-bladder in the horse, as there is in man, the former creature stands in need of a constant supply of bile to mingle with the food he is incessantly taking in, and which, from the compara-

tive smallness of his stomach, cannot be retained long in this organ, but must be quickly passed into the intestines, where bile is necessary for completing digestion.

OF GALL-STONES.

The liver of the horse is seldom diseased, perhaps owing to its being less complicated than in other creatures, being in the horse without a gall-bladder, and consequently wanting a second duct: gall-stones, however, sometimes obstruct the passage of the bile through the hepatic duct; when this fluid, being absorbed by the lymphatic vessels, and conveyed into the system, tinges the eyes, and constitutes a kind of jaundice: but this affection is easily removed by the use of the following purgative *, to be given once a day till it induces purging.

The horse's liver is liable to be affected in consequence of a disease going on in some other organ, as inflammation in the lungs; when the liver becomes irritated, and an increased cir-

* PURGATIVE.

Aloes (Barbadoes)	1 dr.
Calomel	½ dr.
Castile soap	2 dr.

Syrup to form one ball.

culation takes place, which is succeeded by a diminished secretion of bile, and consequent costiveness; but this derivative affection goes off with the original disease.

OF INFLAMMATION OF THE LIVER.

The liver, however, is sometimes subject to inflammation, which, if not attended to in time, may terminate fatally. In this disease the symptoms are:—yellowness of the eyes and mouth; weakness, attended with fever; dark coloured urine; and either costiveness or purging, with apparent dejection of the animal's countenance, and a disposition to continue lying down.

From the great weakness attendant on this disease, bleeding would evidently be improper, except in the commencement of the disorder, and then it should be done sparingly: it will be preferable then, to blister the sides, with a view of diverting the determination of blood to the inflamed liver; and let the following ball* No. 1, be given twice

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* BALL, No. 1.

Aloes (Barbadoes)	1 dr.
Castile soap	$1\frac{1}{2}$ dr.
Calomel	$\frac{1}{2}$ dr.

Syrup to form one ball.

a day, if there be costiveness, until it is removed; but if purging exists, it will be necessary to give the ball No. 2* also twice a day.

OF JAUNDICE.

This disease sometimes exists independent of inflammation of the liver, and may be distinguished from it by the absence of fever and debility, and which always attend the former disorder.

Its principal symptom is yellowness of the mouth and eyes, with purging. The cure consists in giving once a day to the horse, till he begins to recover, the following ball †.

OF THE SPLEEN.

This organ is situated immediately posterior to the stomach, to which it is connected by blood-

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* BALL, No. 2.

Calomel	1 dr.
Opium	1 dr.

Syrup to form one ball.

† BALL.

Opium	1 dr.
Calomel	1 dr.

Syrup to form one ball.

vessels: it is extremely vascular, having a large artery and vein distributed through its substance; it is full of cells, and yet its use is not certainly understood. Its figure is that of a depressed oval, nearly twice as long as broad, and about twice as broad as thick; and it is of a bluish colour, and of a soft spungy texture.

Some have supposed, that the spleen was of use in assisting digestion, by the stomach, when full, pressing that organ against the ribs, so as to prevent the blood flowing into its vessels as usual, and thereby determining more of this fluid into the stomach, to afford a greater supply of gastric juice: but this hypothesis is objectionable; inasmuch as, that the pressure requisite to produce the above effect in the flowing of the blood, must also interrupt its passage into the vessels of the stomach itself. One great service, however, rendered to the economy of the animal machine by the spleen, is the contributing a large supply of venous blood to the liver for the formation of bile: for, from the peculiar arrangement of the vena porta, or vessel conveying the blood to the liver, it is evident that arterial blood would be unfit for the purpose; and the spleen, from its structure, is particularly well adapted for depriving the blood it receives of its arterial qualities,

and fitting it for the immediate secretion of the bile, to the formation of which it is supposed to contribute one half.

The spleen of the horse is seldom diseased; sometimes, however, it is enlarged, but not so often as in other creatures, and for this reason, that the horse's liver is less liable to be disordered than that of most other animals; and the enlargement of the spleen is generally the consequence of an affection of the liver. The spleen is sometimes wholly removed from dogs without creating any material derangement in the system of the animals.

OF THE PANCREAS.

This is a gland like the former organ, and resembles in structure other glandular bodies, being soft and spongy: it lies at the lower part of the stomach, partly across the spine, and is of a yellowish colour, inclining to red. It secretes a fluid very similar in appearance to the saliva; this fluid is conveyed by the secerning vessels into one principal duct, which runs from the pancreas to the duodenum, and pours its contents into that intestine by an opening common to it and the canal from the liver. The pancreatic juice here mingles with the food, and greatly promotes digestion.

OF THE OMENTUM; OR, CAWL.

This, in man and other creatures, is a broad transparent membrane, containing more or less fat, and covering nearly the whole anterior surface of the abdominal viscera, for keeping them moist, and preventing friction. But the cawl in the horse is comparatively small, consisting merely of a very little portion attached to the stomach, and reaching but a very short way posteriorly.

The fat which it contains is enclosed in the duplicature of this membrane, and is secreted from vessels running along the substance of the latter.

OF

DIGESTION.

HAVING now described the digestive organs individually, it will be necessary to take a view of the mode in which they perform their functions collectively: and in so doing we shall, for sake of perspicuity, follow the course of the food, from the time it is taken in by the animal till it reaches its destination, observing the changes it undergoes in the different organs.

First, then, the food being sufficiently broken, and in a manner ground in the mouth, by the action of the teeth; and also being moistened by the saliva, which exudes from the glands in the internal sides of the cheeks, is converted into a pulp, and in this form is forced back into the œsophagus, or gullet: this tube being possessed, as we have said, of a strong muscular power, contracts upon its new contents, and, pressing the food downwards, conveys it into the stomach; and that no part of the aliment can return by this

passage, there is a valvular structure at the lower extremity of the gullet close to the stomach, which permits the entrance of substances into this organ, but prevents their regurgitation; and this, most probably, is one reason why the most powerfully emetic medicines have no effect in making the horse vomit. The food being now received into the stomach, produces an excitement of its internal sensible coat: a gentle movement of this organ is the consequence, which is increased by the action of the abdominal muscles, and the diaphragm in breathing. During this agitation of the food in the stomach it is exposed to the dissolvent power of the gastric juice, which further greatly attenuates it; and to the agreeable stimulus of the food acting against the nerves of the stomach, during that period, is principally to be attributed those pleasing sensations which we feel; and which a horse, and many other creatures, sufficiently evince by their looks and motions they also feel when eating; while, on the other hand, the irritation of these nerves, by the gastric juice when the stomach is empty, is the cause of the unpleasant and painful sensations we have when suffering hunger, and which are wisely and providently implanted in our frames, to warn us of the neces-

sity of a supply of nutriment, and impel us to its acquisition.

The aliment being retained some time in the stomach, is forced out gradually by means of the gentle contractions of that organ through the right orifice into the intestines: here the process of digestion is completed; for the stomach of the horse being comparatively small, and the animal almost constantly eating, the food he takes in must be continually passing out of his stomach, to make room for fresh aliment; and, consequently, it cannot remain sufficiently long in that organ to undergo almost complete digestion, as is the case in other creatures. Hence it is necessary that the intestines be fitted for completing the digestive process, and accordingly we find they are: and that the aliment may not be too suddenly hurried along the intestinal tube, but remain a sufficient time for being fully digested, and also for affording the whole of the nutriment it contains, the stimulus for exciting the action of the intestines, by which the food is carried along, is intentionally mild in degree in the horse; for being without a gall-bladder, he is necessarily denied the more stimulating bile which this little pouch would contain.

The horse, then, being without a gall-bladder, is supplied with bile by a duct leading from the liver, where this fluid is formed directly into that portion of the intestines next the stomach, and termed duodenum: here the bile, together with a secretion from the pancreas, resembling the saliva, are both poured by one opening into the intestinal tube; when mixing with the food just ejected from the stomach, and passing down the gut, these secretions greatly forward digestion. The food now also receives the addition of a mucus, which exudes from the internal surface of the intestines; and being thoroughly mixed with this and the former fluids, by an action of the small intestines, it is at length converted into a milk-like fluid, called chyle, and it is now sufficiently animalized for absorption, or being taken into the system.

This beautiful operation is performed by innumerable small, transparent vessels, whose mouths open almost every where on the internal surface of the intestinal canal. These vessels are termed lacteals, as we have said, from the colour of the fluid they convey. They absorb the chyle in its passage through the intestines, and convey it along the mesentery into the thoracic duct, which is a common tube or trunk, lying principally in the

chest, and into which all the lacteal and lymphatic vessels open. Running close to the spine, the thoracic duct advances into the chest, till, reaching the left jugular vein, it opens into this vessel, and pours into it the whole of its contents. Mingled with the blood, with which it is shortly assimilated, it is first carried to the right side of the heart, thence to be forced through the lungs for receiving the benefits of respiration; and being now returned to the heart, it is propelled from the left side of this organ over the whole of the animal machine, to convey to it new nourishment, and repair its waste.

The remnant of the food, after all the chyle has been extracted, and carried into the circulation by the lacteals, is now passed further down the intestines into the rectum or lower extremity of the gut, whence it is finally eliminated; but that the descent of the contents of the intestines may not be too rapid, they are retarded in their course by the larger intestines, being formed into folds or plaits, and which are well calculated to retain the alimentary matter till the whole of the nourishment it contains is afforded. From this view of the digestive process, it will be seen, that the great difference to be observed between this operation in the horse and in other creatures, is

the absence of a gall-bladder in the former. This peculiarity, we supposed, arose from the smallness of the horse's stomach, and which, not being sufficiently capacious for effecting much of the process of digestion, retained the food but a short time before it passed it into the intestines, where digestion was principally to be performed. Now that the food may not be hurried too soon along the intestinal tube, a mild flow of bile only was better calculated for giving the necessary motion to the intestines, than the more acrid bile contained in a gall-bladder would be; and hence this apparatus was not only unnecessary, but must be injurious in the horse. Why, however, the smallness of the stomach, requiring this peculiar economy in the horse, should exist, is not explained; perhaps a larger stomach, capable of taking in much food at a time, by which this organ must be greatly expanded, and pressure consequently be made on the lungs, which would obstruct these organs in increased respiration, is incompatible with the intention of the horse. He is capable of great speed, and, no doubt, was designed to use it on occasion; and that he may be able to do so without injury and inconvenience, he is furnished with an appropriate small stomach, which, as it offers no obstruction to the full and free action of

the lungs during the period of increased exertion, consequently cannot impede the activity of the animal.

OF THE KIDNEYS.

These glands, for secreting the urine, are two in number: their shape is so generally known as not to require description, and they are placed in the loins, close to the two last short ribs, where they are sustained, one at each side of the spine, partly by the blood-vessels, which belong to them, and in part by a dense cellular membrane, which covers and helps to fix them in their situation. Each kidney consists, first, of a red vascular part, which is outwardmost; this is the secreting substance: secondly, of a whitish and tubular substance, which is immediately within the former, and consists of several small ducts: and, lastly, of the papillary, or membraneous portion, which is the innermost, and contains the pelvis of the kidney.

These organs are designed to drain the frame of its superfluous water; and, with this intent, a certain quantity of the blood is incessantly entering each kidney, by means of an artery which runs directly from the aorta, and opens into this organ at its concave side. The blood being conveyed by the artery, which now ramifies in innumerable mi-

nute branches, into the red, glandular substance of the kidney, here undergoes a change, having the redundant water it contained separated and strained from it; while the remaining quantity of the blood is returned into the circulation by a vein which goes out from each kidney, and communicates with the cava or great vein of the body. The water, thus secreted from the blood, is carried from the glandular portion of the kidney into the pelvis, or reservoir of that organ, by the tubes or ducts which constitute the second or whitish part: these tubes, as they approach the inner substance of the kidney, unite, and, forming larger canals, terminate in a few protuberant orifices, which open into the above cavity, termed pelvis. From this reservoir the water is conveyed into the bladder by two large membraneous canals, which arise, one from the concave side of each kidney, and, running to the bladder, open into its posterior part: here, as in a great reservoir, the superfluous water of the system is collected and retained, till such quantity accumulates as is sufficient to induce irritation of this organ, when contraction of its sides is the consequence, and the contained water is expelled, as shall be explained more fully when we come to speak of that organ.

The secretion of the urine is regulated much, as

to quantity, by the temperature of the atmosphere; for, in cold weather, when the perspiration is greatly diminished, the water passed off by the kidneys is increased; while, in warm weather, on the contrary, when the blood gets rid of much of its redundant water by perspiration, the secretion by the kidneys is considerably lessened. The quantity of fluid taken into the system, also regulates in a degree the secretion of urine; but some animals, as the rabbit, &c., and which are known not to drink, yet secrete urine, which must have been caused by the solid food they eat containing some moisture, and which is afterwards passed off by the kidneys.

It is here to be observed, that the operation of internal medicines in the horse, is much more certain when directed against the absorbing vessels and the kidneys, than when intended to act on the stomach. And hence more can be done to remove disease in the horse, by exciting the action of the kidneys, than by giving medicines to affect the stomach; which is, in great part, owing, as we have said, to a portion of the horse's stomach being insensible to stimulants; and consequently, this organ being less liable to be affected by medicines received into it, and also less apt to propagate its affections to the other parts of the ani-

mal's frame. While, on the contrary, the human stomach, which is wholly and in a high degree sensible of the stimulus it receives, is not only soon affected by the presence of the stimulating substance, but also instantly sends notice of the affection to other parts of the body; and, from this sympathizing connexion between the stomach and the other organs of the human frame, it becomes the principal object for the operation of medicines in disease. But this not being the case in the horse, his kidneys should be the principal organs for being acted upon, with a view to remove diseases; and, accordingly, diuretics are found to produce the best effects in all enlargements of the extremities, owing to the arteries having poured forth a greater quantity of lymph into the cellular interstices than the absorbent vessels could well carry away. In these cases, the diuretic medicines excite the absorbents to quicker action, when the redundant fluid, which caused the swelling, being absorbed and drained from the blood by the kidneys, is finally carried out of the circulation into the bladder.

OF INFLAMMATION OF THE KIDNEYS.

These organs are liable to be affected by inflammation, which is often caused by the too

great exhibition of diuretic medicines; but may also be produced by injuries, as blows upon the loins, and even by the pressure of the saddle, when placed too far back over the loins, particularly where these parts are weak. The inflammation is often confined to one kidney, and is more frequently to be met with in weak than strong-loined horses; and when it is really existing in the kidneys, the symptoms are as follow; viz. the horse stands unusually wide with his hind-legs; on pressing the loins with the hand, the animal flinches, and shows signs of great uneasiness and pain; his pulse is increased; and if only one kidney be inflamed, although the other will secrete urine, yet the quantity of this fluid passed off by the horse, will be considerably diminished; but, on the other hand, if both kidneys are inflamed, then little or no urine can be secreted, and the small portion that may be passed off by the kidneys, is often tinged with the blood. In the first stage of inflammation of the kidneys, the secretion of the urine is increased, as indeed is the case with the secretion of all glandular bodies in the incipient state of their inflammation; but as the disease accumulates, secretion lessens till at length it ceases altogether.

Care should be taken that inflammation of the neck of the bladder, which sometimes takes place,

may not be mistaken for an affection of the kidneys: this is to be distinguished by examining the state of the bladder, which, if found distended and full, indicates that the obstruction and seat of the disease is in the neck of the bladder, and not in the kidneys; but if, on the other hand, the bladder be felt flaccid and empty, then the above symptoms show that the disease is in either one or both of the kidneys. When the inflammation is ascertained to be in the kidneys, the subsequent treatment should be immediately had recourse to.

The horse should be bled to the quantity of three, four, or even five quarts, with a view of lessening the action of the vessels, and preventing the blood being determined in so large a proportion as before to the affected kidney: cold water should be incessantly applied to the loins outside, for constringing the vessels, and diminishing their capacity for receiving fresh blood. The following purgative should also be given; and if the disease does not subside in a few days, repeat it, or give a pint of castor oil; and clysters of warm water should likewise be used. But diuretic medicines must be particularly abstained from, as also such substances as may irritate the diseased kidney; and, on this account, even water, or other moisture, is to be given but sparingly, lest, by exciting the ac-

tion of the kidney, its disease might be aggravated. Should this treatment fail, the actual cautery may be applied to the surface of the loins, with the intention of diverting the blood from the seat of disease by creating an artificial inflammation outside. During the cure the horse should be kept perfectly at rest, and no pressure be made over his loins*.

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* PURGATIVE BALL.

Aloes (Barbadoes)	6 dr.
Castile soap	3 dr.

Syrup to form one ball.

OF

DIABETES.

THIS disease consists in an excessive secretion of urine, and is much more frequent in the human subject than in the horse. It is attended with great heat, and violent thirst; but drinking is found to be productive of mischief, and therefore the use of water and other fluids should be abstained from as much as possible; and as vegetables are known to be favourable to the production of urine, these also should be precluded from use during the continuance of the disease.

The cure of diabetes is effected by confining the patient to the use of animal food; but as the horse has a dislike to feed upon flesh, broths may at first be given; when, after a time, he will be brought to take in solid animal food, and thus the disease will be gradually suppressed.

OF THE

BLADDER.

THIS bag, or pouch, for containing the redundant water of the system, as it is secreted from the blood in the kidneys, till it be collected in sufficient quantity for evacuation, is situated in the cavity of the pelvis, just above the ossa pubis, or share-bones. Its shape is generally known, and it consists of three coats; viz. the two first are muscular, having their fibres crossing, so as, by their contractions, the more effectually to lessen the capacity of the bladder, and, by that means, enable it to expel its contents; and of a third, or mucous coat, for secreting a fluid, which is calculated to defend the internal surface of the bladder from the irritation which must otherwise be produced by the urine. This coat, therefore, is of great importance; for if it ceases to secrete mucus in sufficient quantity, uneasiness and disease will be the consequence. The ureters, we said, when speaking of the kidneys, convey the urine from the pelvis

of each kidney to the bladder; these two tubes enter the bladder obliquely about two inches anteriorly to its neck or outlet, and this obliquity of passage serves all the purposes of a valve for preventing the reflux of urine into either of the ureters.

The bladder is covered anteriorly with the peritoneum or membrane lining the abdomen, but not posteriorly; so that a puncture into this part of that organ through the rectum, does not expose the cavity of the abdomen, no opening being made into it by this operation; and this circumstance should be particularly noticed for directing the treatment of inflammation of the neck of the bladder, in dangerous cases, where the urine requires to be evacuated by the trochar. The outlet of the bladder is called its neck, and leads into the urethra; the muscular structure of this part is very obvious, and, by its contraction, the passage is so completely closed as to prevent all evacuation of the contents of the bladder, till the quantity become so great, that the muscular fibres of the coats of this organ, being forced into action, contract upon the contained fluid, and, overcoming the muscular force at the neck of the bladder, expel the urine at the desire of the animal.

OF INFLAMMATION OF THE BLADDER.

The bladder is liable to have its internal mucous coat generally inflamed, which sometimes terminates fatally. When this disease exists, the bladder is incessantly evacuating the urine, owing to the irritation produced by the want of the mucous secretion, which is now suspended, and which before protected the sensible membrane of the bladder from the stimulus of that fluid.

The cure of this disease consists in bleeding the animal; fomenting the parts contiguous to the inflamed bladder; injecting into this organ warm water; also throwing this fluid up the rectum, and keeping the animal at rest, and warmly clothed. Water and diuretics should be particularly abstained from, lest, by passing into the bladder, they may continue or augment the disease.

OF PALSY OF THE BLADDER.

The fundus of the bladder is sometimes deprived of its power of contraction, owing to injuries or fracture of the spine, and, in consequence of which, the spinal marrow being pressed upon, and the nerves going from it losing their capability of sensation, and of exciting voluntary

motion, the parts to which these nerves are distributed are necessarily rendered insensible and motionless. This is the case in palsy of the bladder; this organ is no longer under the controul of the will, nor does the urine it contains excite any degree of irritation; its sides remain distended with the contents, nor can these be evacuated but by the assistance of the catheter.

A cure can therefore be expected only by first removing the cause; and as fractures of any consequence in the spine of the horse, generally and speedily end fatally, it is almost useless to attend minutely to the affection of the bladder. The urine may occasionally be drawn off by means of a catheter; but the original injury should be the principal object of reparation. This disease is liable to be mistaken for inflammation of the neck of the bladder, as in both these affections no urine being passed, the bladder continues alike distended; but it may be distinguished from the latter disease, first by the circumstance of some injury having happened to the spine of the horse; and secondly, by the ease with which the catheter can be introduced through the neck into the bladder, and which is more difficult to be accomplished in inflammation of that part.

OF INFLAMMATION OF THE NECK OF THE BLADDER.

This disease is more frequent in the horse than are the former affections; but it scarcely ever exists, or at least it is not met with, in mares, owing to the shortness and greater capacity of the female urethra, and which would require an extraordinary degree of inflammation so to close up the orifice of the bladder as to prevent the flowing of its contents.

When this disease is present in the horse, scarcely any urine is voided, and, on examination, the bladder will be found distended with this fluid; for now the neck of the bladder being in full contraction from the inflammatory action which is going on, the passage from that organ is nearly entirely obstructed. But, as we before observed, care should be taken that this disease be not mistaken for palsy of the fundus of the bladder, and which may be discriminated in the manner mentioned when speaking of the palsy of that organ. And that it may not be confounded with palsy of the neck of the bladder, in which disease the urine passes in drops, the state of the bladder should be ascertained; when, if found to be dis-

tended, inflammation of its neck may be concluded upon as the existing disorder.

The treatment of this disease requires much management and nicety, and presents two principal objects for accomplishment; viz. first, the evacuation of the urine from the over-distended bladder; and, secondly, the suppression of the inflammation in the neck of that organ, causing the obstruction. The means to be employed for effecting the latter purpose being similar, whether the disease exists in a horse or mare, we shall describe them first: —Bleeding should be immediately used, as in other inflammatory cases, and for the same purpose; viz. to lessen the action of the blood-vessels, and prevent the accumulation of blood in the diseased part. Fomentations ought also to be employed, and warm water should be frequently injected into the rectum. The animal, at the same time, should be kept warmly cloathed, and at rest, and should have a pint of castor oil administered to him, to obviate costiveness.

Now to evacuate the urine, and which is a principal point to gain in this disease, as it greatly relieves the affected organ, and also the animal, the following methods should be employed. If the patient be a mare, and which we have said is rarely the case, less difficulty occurs in drawing off

the obstructed urine, and this may be accomplished by introducing a catheter gently through the urethra into the bladder; but if this mode fail, it will then be necessary to puncture the bladder; which should be done with a small trocher entered through the vagina, contiguous to the urinary passage. The operation of evacuating the contents of the male bladder will be attended with more difficulty, owing to the greater length and narrowness, and also the curvature of the urethra in the horse; and which circumstances render the introduction of an instrument into the bladder through this long, narrow, and crooked canal, almost impossible to be performed. Hence it will be necessary, first to introduce a staff into the urethra, as far as the great curvature of this passage; and then cut down upon it, as close to the anus as can with safety be done. A catheter should now be introduced through this opening, into the bladder, and before the staff is withdrawn; when the urine may, in this manner, be evacuated.

This operation being certainly attended with less danger than puncturing the bladder, should therefore be preferred; but when it is necessary to perform the latter operation, the trocher should be made to penetrate, either near to the pubis, for

the purpose of avoiding an opening into the cavity of the abdomen, or through the rectum, about an inch or a little more up that intestine. It will scarcely be necessary to observe, that, in all these cases, the means must also be used for abating and suppressing the inflammation, which is the cause of the obstruction, as àlready directed.

OF CALCULI.

The urinary system is sometimes found to contain calculi, or stones, which are deposited by, and formed from, the urine; and which cause the most excruciating torments to the unfortunate sufferer, by their sharp or rough edges irritating the delicate and sensible surfaces of the bladder and other contiguous parts.

This disease seldom attacks the horse, and scarcely ever the mare; and when stones are found in either, their seat, most generally, is the pelvis of the kidney.

OF THE

GENERATIVE ORGANS.

WE now come to the description of those organs by which re-production of the horse is effected, and his species continued in succession. We shall commence with the male organs.

OF THE MALE ORGANS.

The penis is constructed of two separate parts; the first is termed the corpus spongiosum, including the urethra and the glans; and the second portion, constituting the two sides of that organ, is called the corpora cavernosa, from the number of cells which it contains. The glans penis of the horse differs from that of some other creatures, in not being of a round form, as in these; and it also differs from theirs, inasmuch as that in the horse, instead of being confined to the extremity of the penis, it extends some inches along its back. The urethra or passage leading from the bladder and testes, terminates at the extremity of the glans penis,

and its orifice is so constructed, as exactly to correspond with the os uteri, or opening of the uterus. The corpus spongiosum of the horse has a very red appearance, and is interspersed with some strong muscular fibres, as may be seen by examining the sides of his urethra, and which are requisite, considering the great length and curvature of this canal. It is this great length, and the flexures of the urethra of the horse, which make it impossible to evacuate the urine in obstructions of the bladder, by introducing a catheter into that passage; and which therefore renders it necessary to have recourse to the operation of puncturing the bladder, for the purpose of draining off the contained fluid.

The glans and sides of the penis consist of a soft, spongy, and cellular substance; and it is the blood filling up these cells, and consequently distending their sides, which produces erection. This state of the penis is effected in the following manner:—First; the two pudendal arteries, being under some of the influences of the mind, are affected by its venereal dispositions, so as to be excited into an increased action: they therefore, at this time, convey into the penis, over whose substance they are ramified, a greater quantity of blood; and this fluid being deposited in the nu-

merous cells contained in the penis, and its return from this organ into the circulation being prevented by the pressure and consequent obstruction of the veins which could reconvey it, against the pubes, distention of the penis, or erection, is the consequence. The exciting cause being past, and the mind having ceased to exert its late influence, the penis gradually becomes relaxed, the action of the arteries is lessened, the veins, now no longer pressed against the pubes, collect the blood from the cells, and carry it back into the general circulation, till, having emptied them almost entirely, the erection, with the blood causing it, are removed, and the lately enlarged organ is now reduced to its usual dimensions.

OF THE TESTES.

The horse has two glands, called testicles, for secreting the semen, or impregnating fluid; they are lodged in the scrotum, under the posterior part of the penis, and are separated from each other by a thin partition; so that if one be injured, or even destroyed, the other may continue to secrete, and enable the animal to generate his species. In the fœtus, the testes of the horse and of many other creatures are situated a little under the kidneys, in the loins, where they remain in birds

during life; and even in man, and the horse, it sometimes happens that one testicle only descends into the scrotum, the other remaining in the abdomen for the life of the creature: when this is the case in the horse, he is called a rig, although the retained testicle may secrete and be possessed of the generative power, as well as if it had passed out of the abdomen.

The testes begin to descend about the eighth month after birth in the human subject, but not until the eleventh or twelfth month in the horse; and hence it is very difficult to extirpate the testicles of a colt of that age. In the horse, however, these glands begin to secrete semen soon after their descent in the scrotum; but it is not till the thirteenth or fourteenth year that they take on them this office in man; and it is worthy of remark, that the testes are the only glands of the body which do not secrete immediately after birth. While the testicles remain in the abdomen, the spermatic vessels are very short, but as they descend towards the scrotum, these vessels become much longer. In the abdomen the testes are covered with a membrane peculiar to themselves, called tunica albuginea, and which constantly afterwards remains with them: and as they approach the opening of the abdominal ring, they meet the

lining membrane of the abdomen, termed, as we have said, peritoneum, and protruding it round them through this passage out of the abdomen, carry it with them into the scrotum, where it constitutes a second coat, called tunica vaginalis, and which covers, at the same time, the spermatic vessels, enclosing them as in a tube, and adhering, in the human subject, so intimately with the surfaces of these vessels, as to shut up all communication between the scrotum and abdomen, but leaving, in the horse, a small opening between these cavities, so that a fluid or air will pass from one to the other.

The body of each testis is principally composed, like other glands, of blood vessels curiously twisted and convoluted, so as to occupy the least space; and of numerous excretory ducts, or tubes, conveniently and artfully arranged, for collecting the secreted fluids and conveying them into some common channel or reservoir; whilst the whole apparatus is connected together, and its different parts are retained in their proper situations by cellular membrane, and, by that means, form one even, regular, and compact body. The blood-vessels consist of the branches of an artery and vein, which are distributed to each testicle; the artery descends, along the spermatic chord, into

the scrotum, and may be seen entering the substance of the testis: it is this vessel which conveys the blood for the formation of the semen, which is secreted in this gland by some peculiar arrangement or action of its internal parts. The blood which remains, after having afforded the semen, is reconveyed into the circulation by means of veins, which go out from the testes, and ascending through the spermatic chord, enter the abdomen at the ring, and run, the left to the left emulgent vein, because this is nearest, and the right to the cava, or great vein of the body, to pour in their contents.

The semen which is secreted is now collected by numerous small and long tubes, and conveyed to the epidydimus, on the concave side of the testis: the epidydimus consists of a convoluted common tube, or canal, formed by the junction of the various small tubes, and into which these little canals pour the seminal fluid. From the epidydimus is continued a very long tube, called vas deferens, which ascends contiguous to the artery of the testicle along the spermatic chord, and also entering the abdomen through the ring, then bends its course down into the pelvis, between the ureters and bladder, and terminates in the urethra by the same orifice with the vesiculæ se-

minales. Thus the semen is conveyed a considerable distance; viz. first from the gland in which it is formed, to the epidydimus, which is upon the side of the testis, and thence it is carried by the vas deferens, which rises out of each epidydimus, through the abdomen, and down into the pelvis, to be poured out into the urethra, in common with the mucous secretion of the vesiculæ seminales. Formerly these glandular bodies (the vesiculæ seminales) were supposed to have been intended as reservoirs for containing the semen; but it is now more justly believed that they merely secrete a fluid for the purpose of diluting the semen; and this opinion seems the more probable, as a fluid is found in the vesiculæ seminales of geldings as well as in stallions.

OF EXTIRPATION OF THE TESTES.

The testis of the human subject is often liable to be diseased, when it becomes necessary to remove it by an operation: this consists in tying a ligature round the spermatic chord, so as to interrupt the current of blood in the artery, and then cutting away the testicle below the ligature with a knife. But this mode of operation would be attended with danger in the horse, in consequence of the communication remaining open between the

scrotum and abdomen, and which would admit the extension of the inflammation from the former to the latter cavity.

In lambs, pigs, and some other very young animals, castration is often performed by tearing out the testes, when the torn extremities of the blood-vessels are found to unite, so as to prevent any dangerous bleeding; but this method should not be attempted with old animals, as it may prove fatal; and the following mode of removing the testes of a horse is the most preferable:

First, divide the scrotum; then the tunica vaginalis; and now the testicle will protrude, covered only by its internal coat the tunica albuginea, and which it will be unnecessary to divide. Let the chord be now divided by the knife, excepting the blood-vessels, close to the epidydimus, which, with the testicle, are afterwards to be removed; but first apply the clamms (which is a sort of tourniquet) on the blood-vessels, as near the body of the testicle as possible, so that if a hœmorrhage should afterwards take place, there may be sufficient length of these vessels left for repeating the operation of searing. The blood-vessels being properly embraced by the clamms, the operator should now proceed to divide the artery and vein below the point of pressure, with the actual cau-

tery; and this should be done in such manner as, by scraping the coats of the blood-vessels, to leave their divided extremities ragged, by which they will close together the more firmly. Some rosin being now strewed over the divided blood-vessels, their ends are to be seared with the cautery, which, by melting the rosin, serves to plug up the mouths of the vessels, and prevent them from bleeding. But the operator should be certain that he has attained this aim before he wholly removes the clamms, and this he may ascertain by gently relaxing the pressure made on the vessels, when if blood exude through their divided ends, the operation of searing should be resumed. The vessels being now found to be completely plugged up, the clamms may be entirely removed, when the operation is ended.

Both testes being removed, the horse should be carefully treated for some days afterwards: his head should be tied up, and no food given to him for about thirty hours after the operation. And the more effectually to prevent inflammation coming on, he should be bled to the quantity of three or four quarts, provided no great bleeding has taken place at the wound. If there be much swelling about the parts lately operated upon, the horse may be gently exercised with a view of pro-

moting absorption, and even a gentle purgative, such as a pint of castor oil; and diuretics may be had recourse to: but about the third day, when suppuration generally takes place, a different course is to be observed; and instead of keeping the animal low, his diet should now be rich and nourishing.

OF THE UTERUS, AND ITS APPENDAGES.

The uterus is of somewhat a pear-like form, but differs in the mare and other quadrupeds from the human, in having horns. The broader part is called its fundus, the narrower extremity its neck: this is its posterior part, and it terminates by an opening which leads to the vagina, or passage communicating with the outside of the body. This passage, in the mare, is extremely small, compared with the penis of the horse; but then it is also very elastic, and capable of elongation. The uterus is situated between the bladder and rectum, and is constructed of coats which are partly muscular, and in part membraneous. The peculiarity of the horns belonging to the uterus of female quadrupeds has caused a considerable degree of inquiry as to their use; and it seems now to be believed, that their intention is

to contain more than one young: this provision, however, in the female horse, is rendered abortive, perhaps by the change which her constitution suffers from a state of domestication; for it always happens, that when a mare has two fœtuses, both die; as if her system was unable to nourish them together.

From the fundus of the uterus arise two hollow tubes, with fimbriated extremities; they extend towards two bodies, called ovaries, and which are placed contiguous to the uterus. The ovaries consist of a glandular sort of substance, containing the ova, or rudiments of the future fœtuses within it; and it is supposed, that when impregnation takes place, the finger-like extremities of the uterine tubes grasp the ovaries, and squeeze out of them one of the vesicles, or small bodies, which they contain. This may be said to be the origin of the fœtus; for here, in the ovarium, its formation first takes place. It is thence conveyed along the canal of the tube, perhaps by a muscular power, into one of the horns of the uterus, and ultimately attaches itself to the whole internal surface of the uterus of the mare.

OF GESTATION.

The ovum being lodged in the cavity of the uterus, a considerable change takes place in this

organ: it gradually enlarges so as to accommodate the contained fœtus as it grows; and a greater proportion of blood is now also determined into its vessels for affording the proper nourishment. When the ovum has become sufficiently large to enable us to distinguish its parts, we find it consists of membranes containing a fluid, in which swims the fœtus, then gelatinous and without shape. But gradually increasing in size, its parts are, at length, developed; and we see it attached to the whole internal surface of the uterus of the mare by a thick spongy mass. This is called the placenta, and is the organ, through the medium of which the future animal receives its nutrition in the uterus of the mare.

The placenta consists, principally, of blood-vessels, which are collected at the centre of that membrane, so as to form a cord; this cord is continued to the naval of the fœtus, which it enters; and a vein runs from it onwards, to empty its blood into the venous canal, which further conveys this fluid to the vena cava, contiguous to the heart. Having entered the right auricle of the heart, the blood passes by an oval hole (which is peculiar to the fœtal state, being closed up after birth) into the left auricle, and a part finds its way by the right ventricle into the pul-

monary artery; but as even this portion of the blood is not intended to enter the lungs of the fœtus, it is conveyed by a canal (also peculiar to the fœtus, being afterwards closed up), which communicates with the aorta. From the left auricle the blood passes into the ventricle of that side, and thence into the aorta, to be circulated through the fœtal system, for conveying to it the principles of life and nutrition. Thus it will be seen, that the blood does not circulate through the lungs of the fœtus; for breathing being incompatible with the fœtal condition, the lungs require no more of that fluid than is necessary to their growth. The blood, after having given out life and nutriment to the fœtus, is returned to the placenta by two arteries, which arising from the aorta, a little after it has entered and divided into two branches in the pelvis, are called the umbilical arteries: these arteries pass out at the naval along the cord, and re-convey their contents into the placenta.

How the communication between the uterus and placenta is carried on is still a mystery. The supposition, however, is, that the placenta performs an office, with respect to the fœtus, analogous to that of respiration effected by the lungs after birth; and also, that it is the medium for

supplying the blood with new materials for the growth of the fœtus. The period of parturition having arrived, the uterus now contracts upon its contents till they are expelled; and which is generally effected in female quadrupeds without much difficulty or danger. Cut off from further communication, by means of the cord, the lungs of the young animal shortly begin to act; he now respires; and, directed by the smell, he finds in the milk of the mare sufficient sustenance.

OF THE

INTEGUMENTS

OF THE

HORSE.

THE horse, like other creatures, requires certain coverings from Nature, both to protect his frame from injuries and changes of temperature, and to give symmetry and beauty to his figure. Accordingly, we see him furnished with the necessary integuments, consisting of several parts of different structure, but each suited to its intended purpose. We shall commence with a view of that portion of the horse's integuments which lies immediately above the muscles, and is seen directly on removing the skin.

OF THE CELLULAR MEMBRANE AND FAT.

The space between the skin and the flesh is occupied by a loose moist substance, composed of a cellular texture, and containing some fat: it

serves to fill up the depressions of the exterior muscles, and affords a smooth regular surface for the skin to lie upon: and further, it helps to protect the body from too great heat and cold.

But the cellular substance is not confined to the exterior of the frame: on the contrary, it is to be found in all the parts of the body, connecting together the fibres of which the various organs are composed, and serving at the same time as a bond of union to these fibres; and also, by containing fat or moisture, enabling them to slide over each other without injury or inconvenience. It also affords a commodious passage to the blood-vessels and the nerves, and it furnishes a considerable share of the membranes lining the great cavities of the body; insomuch, that this substance constitutes a great portion of the animal's frame. The fat is contained in the cells of this membrane, and is unequally distributed throughout the different parts of the animal: it is in a fluid state in the living creature, and seems to be intended to facilitate muscular motion; but besides this use, it also serves to defend the parts of delicate organization from the injuries which might arise from friction, and also from such external impressions as may interrupt their functions. Besides fat, the cellular membrane also

contains serum, or a thin vapour, for keeping the contiguous parts moist, and enabling them to slide freely over each other.

Formerly the cellular membrane was supposed to be inorganic, but now it is known to be supplied with arteries, veins, nerves, and, in great probability, with absorbent vessels. It is possessed of great elasticity, and contains innumerable small cells, which all communicate with each other, as may be seen by making a small puncture at the neck of an animal, when, by infusing air through the incision, the entire cellular membrane may be inflated, so as to swell out the whole body. This is the reason why an animal after death becomes puffed up with air in summer; for then putrefaction goes on rapidly; and the air, which the substance of the creature contained, being now allowed to escape, finds its way into the cellular membrane, and inflating it throughout, increases the size of the body. And to the same cause is to be attributed the floating of drowned animals after a certain time; for though, at first, the body sinks, yet after the putrefactive process has allowed the air to disengage itself, and enter the cells of the cellular substance, this fluid inflates the whole of this substance, and, consequently, swelling out the frame

and increasing its dimensions, the immersed body becomes specifically lighter than water, and of course rises to the surface, and floats.

OF ABSCESS.

The cellular membrane is frequently the seat of inflammation, and consequent abscess, or deposition of purulent matter: this affection, however, is providently confined to a comparatively small portion of that membrane, by a quantity of coagulable lymph being thrown out in the beginning of the inflammation before pus is formed, and which acts as glue in shutting up the communicating passages between the cellular substance; otherwise the purulent matter must spread over the whole body. Hence an abscess will burst externally after a certain time; for the diseased cells being over distended with pus, and all communication being obstructed with the other cells of this membrane, which now presses on its contents, a passage is at length forced through the skin, by which the pus is evacuated. It is this pressure of the cellular membrane which causes the contained matter to be forced out with such strength as we see it is; and to the cellular substance regaining its situation after the matter of an abscess is absorbed, but which was before

compressed by the fluid distending some of the cells, is to be attributed the reason why there is no loss of substance to be observed afterwards. Another beneficent provision in the economy of the cellular membrane is, that abscesses will make their way to the surface rather than disturb and endanger parts internal and more important: thus, an abscess will form between the peritoneum and the abdominal muscles, and, instead of bursting through the peritoneum into the cavity of the abdomen, the purulent matter will force its way through the muscles to discharge itself externally.

The treatment of an abscess consists either in resolving it by absorption, or evacuating the matter. The first is the most preferable method, and should always be attempted in the incipient state of abscess, when there is probability of success. The most effectual means for promoting resolution by absorption are; viz. general bleeding, with a view to lessen the inflammatory action of the system; topical applications to the affected part, such as scarifying, bleeding with leeches, and cold applications, such as solutions of sugar of lead, with water, vinegar, &c.; purgatives and clysters should also be employed; and the horse

should be kept on low diet, and all warm applications be abstained from, as they tend to promote suppuration.

These remedies, when used sufficiently early, will in general succeed in discussing an incipient abscess; but should they fail, and the abscess be advanced in size, and the formation of pus; then the contents must be evacuated, and the treatment changed to the direct opposite of what we have recommended for resolving the abscess by absorption. Accordingly, general and local bleedings are to be avoided; no purgatives should be given, and the patient's strength ought to be supported, as much as possible, with full and nourishing food, to enable it to sustain the loss it is about to suffer. The matter also should be evacuated by a small opening made in the most depending part of the abscess; and not continued from end to end, as was formerly the practice; and in consequence of which great irritation was induced, and the patient sometimes destroyed. And should the abscess be very large, it will be more advisable to evacuate the matter by degrees, allowing the small orifice to close, and the abscess to fill again, and thus to repeat the evacuation till it be wholly emptied, than to discharge all the matter at once, by which great irritation and danger may be brought on.

OF THE SKIN.

This consists, in the horse, of two layers; viz. the true-skin, and scarf-skin. The first is spread immediately upon the cellular substance, which we have described, and is that, which, after the operation of tanning, is called leather: it is full of vessels, and is possessed of a great degree of sensibility, being supplied with nerves, which are distributed throughout its substance, for enabling the animal to gain a knowledge of such bodies as he may be in contact with. This portion of the skin is also very strong and elastic, and is well calculated for giving compactness to the parts beneath, and also for protecting them from external injuries, and from violent changes of temperature.

External to the true skin, and covering it, lies the cuticle, or scarf-skin, and which is the part which rises into vesicles by the operation of blisters. It is a fine, thin, but insensible membrane, and seems intended to serve as a defence to the sensible skin underneath from the action of the external air, and also to modify its sensibility by interposing itself between it and the impressing bodies. The cuticle is perforated by an immense number of pores or openings, by which the perspirable matter is expelled from the body.

OF THE GREASE.

This is an inflammation, swelling, and consequent discharge attacking the skin covering the heels of horses: it is brought on by sudden and great changes of temperature, and prevails only in the winter, and most in the wet season. It is never known to attack horses that have not been domesticated; nor does it commence during the time horses are at grass. Horses of a light colour, and particularly where the legs are white, are much more liable to be affected with grease than are horses with dark coloured legs; and hence it would appear, that the skin bearing light coloured hair, is more delicate and susceptible of injury than skin covered with dark or black hair; and this supposition is further corroborated by seeing that the hair growing from new formed skin, and which is less perfectly organized than the old, is always white: the hind legs also are more frequently greased than the fore-legs, owing to their greater distance from the heart, and the circulation in them being consequently weaker.

The change of temperature causing grease, is that which a horse undergoes in being removed from a cold, wet situation, to a warm one: thus, horses taken from grass or camp, and put into

warm stables, will often be greased in a very few days afterwards, and particularly if the proper methods be neglected for preventing it; for the heels being mostly wet while the horses were abroad, and consequently subject to bear a greater degree of cold than could have affected them had they remained dry, now that the horses are changed from this cold situation into a warm one, they become inflamed by the increased heat of the stable, and grease is the consequence. To prevent, then, as much as possible the change of temperature producing grease, the following rules should be observed on removing horses from camp or grass into stables. First, the stable doors and windows should be thrown open during the day, to prevent the too great accumulation of heat, which may afterwards be gradually increased, and the stables ought also to be kept particularly clean: the diet of the horse should be gradually increased; his legs well hand-rubbed; and, above all, the horse ought to be regularly exercised each day, which, together with the friction, will promote the circulation in the heels, and promote absorption of any fluid which may be determined to these parts.

The symptoms of grease are; viz. swelling of the legs, attended with heat; soon after this, the inflamed skin, covering the heels, becomes cracked,

and an offensive discharge also takes place. The horse, after having stood still for some time, walks lame at first, owing to the pain he suffers from the tearing asunder of the cracks, and which, during his rest, were beginning to unite. The discharge increases in quantity and offensiveness, but does not cause ulceration, besides the cracks above mentioned; being merely the natural secretion of the skin covering the horse's heels, but increased and changed by the inflammatory action going on in the vessels of the parts.

To cure this disease, it will be necessary to begin with poultices and fomentations of warm water, and which should be frequently applied to the affected parts, with the view of removing the inflammation. The following diuretic ball * should be occasionally given to promote absorption; and, with the same intention, exercise ought also to be frequently had recourse to. When the inflammation has subsided, and which is often obstinate, and not to be suppressed for four or five weeks,

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* DIURETIC BALL.

Venice turpentine	1 oz.
Castile soap -	2 oz.

Powdered anise-seeds enough to give consistence—to be divided into three balls.

astringent medicines may be used for the purpose of putting an end to the discharge: those mostly used are blue vitriol and alum, which may be applied alternately, either dissolved in water or finely powdered. Exercise and a diuretic ball (after proper intervals) may still be continued, and will accelerate the cure; and that the applications may have the better effect, the hair should be kept close cut, and the skin frequently washed with warm water and soap.

Sometimes, in grease, the skin becomes of an unusual thickness, from the great quantity of fluid which is determined into it by the inflamed action; and numerous excrescences, termed grapes, from their seeming to grow out in bunches, appear on it: when this is the case, these excrescences should be removed by the actual cautery. Grease is apt to produce another and more dangerous disease, called canker; and for which see p. 65; for the inflammation of grease increases the growth of the hoof; and the frog being, in consequence, raised too far from the ground to admit longer of pressure, and also being in a continual state of moisture from the greasy matter of the heels running down upon it, canker is the consequence.

OF THE MANGE.

The skin of the horse is sometimes affected with a disease termed mange; it is at first perceived by the animal's constantly biting or rubbing the affected part against the stall in which he stands: shortly after the hair begins to fall off, particularly from the mane and tail; and ulceration ensues.

The mange is generally propagated by contagion, but, no doubt, it sometimes originates from low feeding, and want of attention in keeping the horse's skin sufficiently clean. The cure consists in rubbing well the affected skin with the following ointment*, when the disease will generally give way. In obstinate cases, however, the external application may be assisted by the use of small doses of calomel, or emetic tartar, given internally, with a view to restore the proper action of the vessels of the skin.

This disease should not be mistaken for a

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* MANGE OINTMENT.

Oil of turpentine	2 oz.
Sulphur vivum	3 oz.
Hog's lard	5 oz.

Mixed.

slight itching, accompanied sometimes with a small degree of eruption on the skins of horses getting rapidly into condition, and which requires merely a gentle evacuation, either by bleeding or purging; or perhaps an increased degree of exercise will be sufficient to carry it off.

OF MALLENDERS & SALLENDERS.

This is a scurfy affection of the bend of the knee, or hock-joint. When it takes place on the posterior part of the former joint, it is called mallenders; but if it exist on the anterior surface of the latter, or hock-joint, it is then named sallenders.

It sometimes causes lameness; in which case it will be fit to give the horse a purge, and afterwards dress the affected part daily with the following ointment*.

OF SITFASTS.

Owing to injuries from the saddle, callosities are apt to form in the skin beneath, which are termed sitfasts.

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* OINTMENT.

Oil of turpentine	3 dr.
Vitriolic acid	1 dr.

Mix slowly, and add of

Ointment of wax, or spermaceti, 3 oz.

They should be dressed with some stimulating ointment, until the callous part can be removed, when the sore may be treated in the usual way.

OF SADDLE GALLS.

But the skin under the saddle is more frequently liable to be so injured as to run into inflamed tumours called saddle-galls or warbles.

These are sometimes troublesome, if not attended to in time; but by an early application of some repelling solution, as sugar of lead and water, or vinegar, the tumour may be soon discussed: if, however, matter has formed, it should be evacuated by the lancet, and the sore afterwards healed as on ordinary occasions.

OF BEING HIDE-BOUND.

As this affection, though its cause is seated elsewhere, appears particularly in the skin, we shall treat of it in this place.

When the skin of a horse appears so closely attached to his ribs, that it is with difficulty it can be moved over them, or grasped with the hand, so as to draw it gently out from them, and that at the same time his coat has an unhealthy stare, the animal is said to be hide-bound.

This disease generally arises from impoverishment, owing to an imperfect digestion, scanty or bad food, worms, and sometimes bad grooming and want of cleanliness.

In all these cases, it will be necessary first to trace the cause, and endeavour to remove it, and, at the same time, to attend to the grooming of the animal; and should no particular cause be observable for the horse's want of a healthy condition, give the following ball* once a day till it produce purging, and let the animal be regularly exercised and kept warmly clad.

OF BROKEN KNEES.

In these cases the skin only being frequently injured, we shall treat of them here.

Whether so, or if the wound be deeper, first clean it well of all extraneous matter, and then apply a cold bran poultice, well moistened with extract of Goulard, once or twice each day, for a few days, to prevent and keep down the inflammation.

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* BALL.

Aloes (Barbadoes)	2 oz.
Castile soap	$2\frac{1}{2}$ oz.

Syrup to form them into eight balls.

After this, when the wound assumes a healthy appearance, the poultice may be laid aside, and the sore dressed with digestive ointment; and should any swelling continue after the part is healed, apply a gentle blister to remove it by absorption, and which will also advance the growth of the hair over the late wound.

OF THE CURB.

Though this is not an affection of the skin, but of the parts underneath, yet the cure consisting in an application to the former, we have classed it here.

The curb is a swelling on the back part of the hock, sometimes occasioning lameness, and the cure is to be effected by rest, and repeated blistering.

OF WIND-GALLS.

These puffy swellings also are situated, not in the skin, but in the mucous bags or purses underneath. They usually appear above the fetlock-joint, and are common to all the legs.

They are in general produced by hard labour, and working the horse when very young: the cure consists in applying successive blisters, with rest.

OF THOROUGH PIN.

This disease likewise consists in a puffy enlargement of the mucous bags, situated on both sides of the hock.

It is also brought on by hard labour, and requires rest and blistering to remove it.

OF THE

HAIR.

THE last and most external covering of the horse is his hair. All animals are more or less defended against the cold; some have wool; others feathers; and more again, hair; and of this class is the horse. The hair arises from distinct capsules, or bulbs, which are seated in the cellular membrane, immediately under the skin. Sometimes a bulb will enclose more than one hair, but most generally each hair has its separate bulb. The hairs grow from these bulbs as from roots, and from them they receive their nourishment: the bodies of the hairs are the parts which shoot beyond the skin.

The hairs, by retarding the passage of the heat generated within from the body of the horse, preserves to the animal machine a sufficient degree of that property, and without which even life itself would be unable to continue its functions; and besides this essential service, which we see

the hair renders, it also serves as a beautiful ornament to the exterior of the animal, from the agreeableness of the colours it exhibits, and which is rendered particularly pleasing, when the horse is in full health and condition, and his skin and hair well dressed.

OF CASTING THE HAIR.

Horses cast their hair once a year, some in autumn, but the greatest number in spring; and as there is a great change, attended with some debility, to be observed in the animal during the time he is throwing off the old hair, particular attention should be paid to him at that period.

The weakness he then shows, and his consequent liability to be affected by cold, in all probability arises; the first, from the great proportion of blood which is determined from the other parts of the frame towards the skin for supplying the growth of the new hair; and the second circumstance, or susceptibility of cold, from the unprotected condition of the sensible skin during the interval between casting the old hair and the growth of the new, and which must render it more liable to be affected by the cold.

During this period, then, the horse should be kept more warmly clad than before, and his diet ought to be full and nourishing.

OF

WOUNDS.

BEFORE we close these sheets, it will be necessary to offer a few words on wounds, some of which are often attended with dangerous and alarming symptoms.

The different parts of a horse are liable to be wounded, which consequently exhibit different symptoms, and also require different modes of treatment, adapted to the part or organ on which the wound is inflicted. Thus the skin and flesh only may be cleanly cut; when it will be merely necessary to bring the divided parts together, and by a bandage, or other means, retain them in that situation, till nature, of her own power, effect a cure, which will be accomplished in a short time. This is called healing by the first intention, and the wound is termed a simply incised wound. All wounds of this description should be treated in a similar manner.

Another class of wounds, differing from the former, are called lacerated or contused; they are

more dangerous, because attended with more inflammation, and require generally a different treatment. In these wounds, a considerable portion of the surrounding organization being torn or otherwise destroyed by the blow or fall, there must be a regeneration of new and sound parts, in room of the lost or ruptured fibres; and this can be accomplished only by the production of a healthy, thick, whitish matter, which is calculated to replace the destroyed parts. To assist the production of this regenerating matter, then, should be the object in these wounds; and for this purpose, it will be necessary, if the horse be plethoric, and the wound extensive, first, to bleed and give a gentle purge, to regulate the inflammation, and prevent gangrene, and at the same time foment and poultice the wounded parts frequently: by these means a healthy pus will be speedily formed, and the wound will gradually heal. It will be necessary now also, to support the patient, and dress the wound with digestive ointment.

Should much bleeding occur from the wound, it should be examined if any principal branch of a blood-vessel be divided; in which case, it ought to be tied up; or, if this cannot be effected, use pressure on the part.

Punctured wounds are extremely dangerous,

owing to the great laceration generally accompanying them, and the depth they enter; and hence particular care should be observed in their treatment.

In wounds of the joints, which penetrate into their cavities, there is great danger of losing the animal, owing to the violent and painful inflammation and irritation which take place in the joint, from the access of the air, and the flowing out of the synovia, and which is intended to protect the surfaces within the joint from being injured by friction one against the other, but which now, in the absence of the synovia, takes place, increasing the inflammation and anguish of the part.

Here, then, the object is to exclude the external air, and also to confine the synovia, by closing up the orifice of the wound leading into the cavity of the joint; and this is best effected by the application of the actual cautery to the lips of the wound, which, by properly searing them, will cause a coagulable fluid to be thrown forth for plugging up the orifice; and should the first operation not be sufficient, it will be necessary to repeat it. The symptomatic fever also, which accompanies wounds of joints, must be kept down by bleeding and giving occasional purges.

Wounds of the feet, from picking up nails, &c.

should also be carefully attended to. First, it will be necessary to see that the body causing the wound be extracted, together with any dirt that might have accompanied it; then pare the sole rather thin over the wounded part, so as to relieve the pressure by thinning the sole, and dress with a pledget of tow dipped in tar. And should inflammation, with swelling of the limb, take place, it will be necessary to bleed the horse generally and topically, and also to give him a purge.

THE END.

JOYCE GOLD, PRINTER, SHOE LANE.